EVIDENTIARY VALUE OF FORENSIC EXPERT OPINION UNDER SECTION 45 OF THE INDIAN EVIDENCE ACT, 1872

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ABSTRACT

The increasing reliance of forensic science in the investigation of crimes has transformed the evidentary system of Indian courts. Experts opinion is recognized in Section 45 of Indian Evidence Act, 1872[1] as relevant matters involving issues related to science, art, handwriting, fingerprints, and medical jurisprudence. Nevertheless, the Indian courts have constantly ruled that the opinion given by forensic experts is only advisory and not decisive evidence. The paper critically evaluates the admissibility and the evidentiary value of forensic expert opinion based on Section 45 of the statutory interpretation, judicial precedents and socio legal analysis. It also assesses several key areas of forensic science such as handwriting analysis, fingerprint identification, DNA profiling, ballistic analysis and medical evidence as well as considering constitutional restrictions on privacy rights,[2] right against self-incrimination[3] and procedural fairness. The paper identifies institutional challenges like infrastructural deficiency, risks of contamination, judicial scepticism, and institutional biasness. It proposes an alternative evidentiary model whereby diverse weight can be assigned to the various forensic methods in accordance to their scientific reliability while strengthening procedural safeguards and forensic governance.

Keywords: Forensic science, expert opinion, Section 45, Indian Evidence Act 1872, admissibility of evidence, evidentiary value, handwriting analysis, fingerprint identification, DNA profiling, ballistic analysis and medical evidence, right to privacy, right against self-incrimination.

[1] Indian Evidence Act, 1872, § 45 (India).
[2] India Const. art. 21.
[3] India Const. art. 20(3).

INTRODUCTION

The criminal justice system is inherently geared towards the establishment of truth without prejudice over the accused. The courts are entrusted with a dual role of convicting the guilty as well as safeguarding the innocent, which is becoming more complicated in the age of technology. In the rapid growth of science and investigative methods, a modern adjudication is often technical and specialised, and falls out of the normal knowledge and experience of the judges. To accommodate this changing complexity, forensic science, which is the scientific method of law investigation, has emerged as a central pillar of contemporary criminal justice systems throughout the world.[4]

Forensic evidence has taken a prominent position in criminal trials in India. DNA profiling, fingerprint identification, cyber forensic analysis, ballistic examination, handwriting analysis, and medical opinions are some of the scientific methods that are regularly encountered in court to prove identity, recreate a crime scene, causation, and reveal the unreliability or absence of eyewitnesses.[5] Nonetheless, the increased use of forensic methods has also generated issues in terms of scientific dependability, protection of the process, the right to privacy, institutional prejudice, and the risk of coercion or misuse.[6]

The Indian legal system permits this scientific development and evolution through Section 45 of the Indian Evidence Act, 1872[7] that acknowledged the expert opinion as a fact of relevance in case of technical issues.[8] Although Section 45 eases the admissibility but does not make expert evidence conclusive. Indian courts have stressed that the opinion of the forensic experts is always advisory in nature and it should be assessed like any other evidence and should be corroborated before it can be relied upon to help in conviction.[9]

Judicial reluctance to regard forensic evidence as final is indicative of an appreciation of scientific fallibility, infrastructural incompetence in forensic organizations, failure in procedures in the process of handling evidence, and risks of excessive reliance on expert

[4] Manvi Maurya & Dr. Srijan Mishra, Evidentiary Value and Admissibility of Forensic Evidence, 8 Int'l J.L. Mgmt. & Human. (2025).
[5] Id.
[6] Id.; Divishyaa Ta, Evidentiary Value of Forensic Accounting, Auditing, and Investigation in Financial Crimes, 3.2 JCLJ 2009 (2023).
[7] Indian Evidence Act, 1872, § 45 (India).
[8] Indian Evidence Act, No. 1 of 1872, § 45 (India).
[9] Isha Ananda, Admissibility of Expert Opinion in the Court of Law, 3.2 JCLJ 277 (2023).

authority. In *Murari Lal v. State of Madhya Pradesh*,[10] The Supreme held that expert evidence generally requires corroboration and cannot be treated as conclusive proof. Similarly, in *Chennadi Jalapathi Reddy v. Baddam Pratapa Reddy*, the Court decided that expert testimony alone is insufficient to sustain conviction.[11] Courts have further emphasised that unsupported expert opinion lacking proper reasoning carries minimal evidentiary value.[12]

At the constitutional point, the broad use of forensic methods has brought to the fore an increased judicial apprehension. In *Selvi v. In State of Karnataka,* the Supreme Court Court invalidated involuntary narco-analysis, polygraph, and brain-mapping tests as violations of the right against self-incrimination under Article 20(3) of the Constitution.[13] Further, in *Justice K.S. Puttaswamy (Retd.) v. Union of India*, The Court acknowledged the right to privacy as a fundamental right[14], thereby subjecting forensic procedures involving bodily intrusion to strict tests of legality and proportionality.[15]

Despite these measures, forensic technologies especially DNA profiling have proved to be more scientifically reliable. The further use of even-handed judicial scepticism thus brings up significant concerns in terms of the evidentiary weight which is accorded to various forensic disciplines. The increasing conflict between science and judicial discretion therefore constitutes the key question to this paper that critically analyzes the evidentiary worthiness of forensic expert opinion under Section 45 of the Indian Evidence Act in the light of doctrinal, constitutional and socio-legal approaches.

RESEARCH OBJECTIVES

The growing use of forensic science in the Indian criminal justice system has dramatically transformed the evidentiary practices. While Section 45 of the Indian Evidence Act, 1872[16] statutorily recognises expert opinion as relevant but judicial interpretation has consistently limited its probative value to a corroborative effect. Scholarly literature further indicates a consistent ambiguity in admissibility standards, infrastructural inadequacy and constitutional

[10] Murari Lal v. State of Madhya Pradesh, (1980) 1 SCC 704 (India).
[11] Chennadi Jalapathi Reddy v. Baddam Pratapa Reddy, (2019) 14 SCC 220 (India).
[12] State of Maharashtra v. Damu Gopinath Shinde, (2000) 6 SCC 269 (India).
[13] Selvi v. State of Karnataka, (2010) 7 SCC 263 (India).
[14] India Const. art. 21.
[15] Justice K.S. Puttaswamy (Retd.) v. Union of India, (2017) 10 SCC 1 (India).
[16] Indian Evidence Act, 1872, § 45 (India).

conflicts which arise out of intrusive forensic practices.[17] Although scientific reliability has increased in disciplines like DNA profiling, all forms of forensic methods are subject to the same line of sceptical scrutiny.[18]

Against this backdrop, the present research is undertaken with the following objectives:

1. To examine the statutory scope and application of Section 45 of the Indian Evidence Act, 1872

This paper aims to examine the intent of Section 45 in the legislature as well as how the Section is construed by the courts with reference to its role of making expert opinion relevant and non-conclusive. The objective of evaluation is to determine whether the provision is sufficiently flexible to handle the ever-evolving forensic technologies or is limited by the nineteenth-century evidentiary presumptions.[19]

2. To analyse judicial treatment of forensic expert opinion in Indian courts

The study will critically analyze the jurisprudence of Supreme Court and High Court on the subject of handwriting analysis, fingerprint evidence, DNA profiling, ballistic examination and medical opinion. The study measures the reliability, corroboration and methodological soundness of expert testimony by the courts through case law analysis.[20]

3. To assess the evidentiary value of different forensic disciplines based on scientific reliability

To determine the level of evidence of various forensic fields in scientific reliability. In understanding that there are wide differences in empirical validity of forensic techniques, the study attempts to draw the distinction between subjective techniques like handwriting comparison and scientific techniques like DNA profiling. This aim is concerned with whether the Indian courts ought to have a measured evidentiary approach as opposed to a consistent scepticism.[21]

[17] Isha Ananda, Admissibility of Expert Opinion in the Court of Law, 3.2 JCLJ 277 (2023); Divishyaa Ta, Evidentiary Value of Forensic Accounting, Auditing, and Investigation in Financial Crimes, 3.2 JCLJ 2009 (2023).
[18] Mukesh v. State (NCT of Delhi), (2017) 6 SCC 1 (India).
[19] Indian Evidence Act, No. 1 of 1872, § 45 (India).
[20] Magan Bihari Lal v. State of Punjab, (1977) 2 SCC 210 (India); Mahmood v. State of Uttar Pradesh, (1976) 1 SCC 542 (India); State of Maharashtra v. Damu Gopinath Shinde, (2000) 6 SCC 269 (India).
[21] Mukesh v. State (NCT of Delhi), (2017) 6 SCC 1 (India).

4. To evaluate socio-legal and institutional challenges affecting forensic credibility

This paper will analyze such problems in the system such as infrastructural inadequacy, risk of contamination, or lapses in procedures, insufficiency in training of experts, and institutional bias in the forensic labs. It assesses how these realities influence judicial reluctance to rely on forensic evidence.[22]

5. To analyse constitutional limitations on forensic practices

The study aims at examining how the right against self-incrimination[23] and the right to privacy[24] limit the collection and admissibility of forensic evidence. It severely analyzes historic rulings governing unavoidable scientific testing and biometric policing in criminal investigations.[25]

6. To propose reforms for balanced and effective reliance on forensic expert opinion

A study will be recommended on the basis of doctrinal and socio-legal results suggesting institutional, legislative, and judicial reforms such as forensic accreditation measures, differentiated evidentiary standards, improved procedural safeguards, and judicial capacity building.

LITERATURE REVIEW

The evidentiary value and admissibility of expert opinion under Section 45 of the Indian Evidence Act, 1872 have attracted sustained scholarly and judicial engagement. While forensic science has become increasingly indispensable to criminal adjudication, legal literature consistently highlights judicial reluctance to accord expert evidence conclusive status.

Divishyaa Ta, in *Evidentiary Value of Forensic Accounting, Auditing, and Investigation in Financial Crimes*[26]*,* examines the judicial reception of expert forensic evidence within Indian courts.[1] Published in the *Journal of Criminal Law and Justice*, the study demonstrates that

[22] Manvi Maurya & Dr. Srijan Mishra, Evidentiary Value and Admissibility of Forensic Evidence, 8 Int'l J.L. Mgmt. & Human. (2025).
[23] India Const. art. 20(3).
[24] India Const. art. 21.
[25] Selvi v. State of Karnataka, (2010) 7 SCC 263 (India); Justice K.S. Puttaswamy (Retd.) v. Union of India, (2017) 10 SCC 1 (India).
[26] Divishyaa Ta, Evidentiary Value of Forensic Accounting, Auditing, and Investigation in Financial Crimes, 3.2 J. Crim. L. & Just. 2009 (2023).

despite statutory recognition under Section 45, forensic reports continue to function primarily as corroborative material rather than decisive proof. Ta explains this pattern by the insufficiency of infrastructures, the absence of specialised structures of governmental forensics, and the ongoing issues of the impartiality of privately hired professionals.

Similarly, Isha Ananda's article titled *Admissibility of Expert Opinion in the Court of Law*, also published in the *Journal of Criminal Law and Justice*, offers a doctrinal explanation of the jurisprudence of expert evidence corroboration.[27] The article was conducted with reference to the prominent Supreme Court and High Court cases that have provided a consistent support of the demand on expert testimony corroboration by the judiciary. The author states that scientific opinion has an inferential character and may be mistaken because of methodological error, this is why a cautious attitude of the courts to forensic evidence is justified.

From a socio-legal and constitutional standpoint, Manvi Maurya and Srijan Mishra, in *Evidentiary Value and Admissibility of Forensic Evidence in Indian Courts*[28], examine the growing application of forensic science and systemic and rights-based issues such as backlog in forensic labs, contamination risks, lack of accreditation systems, and lack of proper professional training.[29] Published in the International Journal of Law, Management and Humanities. The authors also develop on the constitutional restrictions posed by the right against self-incrimination and the right to privacy, and find that forensic efficiency should be applied in retrospect to basic rights protection.

Doctrinal foundations are comprehensively articulated by Ratanlal and Dhirajlal in their authoritative commentary *The Law of Evidence*.[30] The authors explain that expert testimony constitutes an exception to the rule of best evidence, which is, nonetheless, advisory in character. They warn that scientific findings are conditional upon the integrity of a procedure, sample reliability, and sound methodology and hence require corroboration. This doctrine still informs the judicial reasoning on the case of forensic expert opinion.

Collectively, these works represent a scholarly agreement that forensic science is an important investigative instrument but at the same time a tool with its own limitations. It is important to

[27] Isha Ananda, Admissibility of Expert Opinion in the Court of Law, 3.2 J. Crim. L. & Just. 277 (2023).
[28] Manvi Maurya & Srijan Mishra, Evidentiary Value and Admissibility of Forensic Evidence in Indian Courts, 8 Int'l J.L. Mgmt. & Human. (2025).
[29] *Id.*
[30] Ratanlal & Dhirajlal, The Law of Evidence 381–85 (27th ed. 2016).

note that the current literature mostly regards forensic evidence as a homogenous category of evidence that is not well distinguished as to distinguish between empirically supported tools like DNA profiling and subjective ones like handwriting analysis. This study attempts to fill this analytical gap by supporting the differentiated evidentiary paradigm based on scientific reliability and procedural protection.

Theoretical Framework

This study adopts an integrated analytical framework combining doctrinal prudence, scientific reliability, procedural integrity, and constitutional balancing to evaluate forensic expert opinion under Section 45 of the Indian Evidence Act.[31]

1. Corroborative Evidence Theory

The conceptualisation of this theory views expert opinion as supportive and not conclusive. The Indian courts always uphold that forensic evidence is helpful in judicial cognizance but they should be supporting by independent material. This method counters dogmatic commitment to the authority of science and the inferential character of professional judgments.[32]

2. Scientific Reliability and Validation Theory

This framework distinguishes between approaches to forensics on the basis of empirical soundness. Disciplines such as DNA profiling, with its scientifically confirmed statistical validation and international standardisation deserve a higher evidential weight than such subjective methods as handwriting comparison, which cannot be scientifically tested and is susceptible to cognitive bias.[33]

3. Procedural Integrity Theory

This perspective emphasises to the fact that evidentiary value does not only rely on the scientific methodology but also on the correct handling of evidence. Chain of custody,

[31] Indian Evidence Act, 1872, § 45 (India).
[32] Murari Lal v. State of Madhya Pradesh, (1980) 1 SCC 704 (India); Chennadi Jalapathi Reddy v. Baddam Pratapa Reddy, (2019) 14 SCC 220 (India).
[33] Mukesh v. State (NCT of Delhi), (2017) 6 SCC 1 (India).

contamination, and delay are breakdowns that compromised forensic reliability and are a reason to doubt in courts.[34]

4. Constitutional Balancing Theory

Forensic science practices within constitutional limits of personal liberty, privacy as well as fair trial rights. Court review will mean that investigatory efficiency does not override fundamental rights guarantees.[35]

Together, the frameworks are a holistic way of looking at forensic expert opinion through the lens of doctrinal, scientific, institutional, and constitutional perspectives.

SOCIO-LEGAL ANALYSIS

A. Concept of Expert Evidence under Section 45 of the Indian Evidence Act, 1872[36]

Section 45 of the Indian Evidence Act, 1872[37] constitutes the statutory foundation for the admissibility of expert opinion in Indian courts. It provides that the opinion of individuals specially qualified in a particular field of science, art, foreign law, handwriting or fingerprint identification, will be a fact to be kept in consideration when the court must make an opinion on a scientific, artistic, foreign, handwriting, or fingerprint identification issue.[38] The provision reflects legislative recognition that judicial competence does not extend to technical scientific matters and that expert assistance is indispensable for accurate fact-finding.

The task of forensic science is carried out within constitutional provisions regarding the rights of personal liberty, privacy and the right to fair trial.[39] Review by the court will imply that the efficiency of investigation will not overrun the elementary rights assurances.8put together, the structures will be a comprehensive perspective of perceiving forensic expert opinion via the doctrinal, scientific, institutional, and constitutional lenses.

[34] Maurya & Mishra, supra note 3.
[35] Selvi v. State of Karnataka, (2010) 7 SCC 263 (India); Justice K.S. Puttaswamy (Retd.) v. Union of India, (2017) 10 SCC 1 (India).
[36] Indian Evidence Act, 1872, § 45 (India).
[37] *Id.*
[38] Indian Evidence Act, No. 1 of 1872, § 45 (India).
[39] INDIA CONST. art. 21.

However, Section 45 merely renders expert opinion relevant and does not accord it determinative force. Unlike direct evidence, expert testimony is inferential in nature, drawn from scientific analysis rather than personal observation. Consequently, Indian courts have consistently interpreted the provision as creating an exception to the best evidence rule while maintaining judicial discretion over probative value.[40]

The authority on doctrines underscore the fact that expert evidence is not a substantive evidence but only advisory. Ratanlal and Dhirajlal observe that expert testimony can only supplement judicial reasoning and cannot be used to substitute independent assessment of facts especially when scientific findings are based on assumptions, sample integrity, and procedural accuracy.[41] This doctrine caution is the basis of judicial skepticism of accepting forensic evidence as definitive.

B. Judicial Interpretation of Forensic Expert Opinion

The corroborative character of expert testimony has always been supported in Indian jurisprudence. In *Murari Lal v. State of Madhya Pradesh,* the Supreme Court believed that expert opinion is feeble in nature and it ordinarily requires corroboration before it can be resorted to in order to convict. The Court stressed that the opinion of science as persuasive as it may be cannot take the place of judicial appraisal of circumstances around.

Similarly, in *Chennadi Jalapathi Reddy v. Baddam Pratapa Reddy*, the Supreme Court ruled that expert testimony cannot form the sole basis of a judicial finding and must be evaluated alongside other evidence.[42] This reflects a broader judicial philosophy of evidentiary prudence.

The Court further elaborated on methodological reliability in *State of Maharashtra v. Damu Gopinath Shinde*, where it held that unsupported expert conclusions lacking scientific reasoning or evidentiary foundation carry minimal probative value.[43] Mere assertion by an expert does not constitute proof.

Thus, judicial interpretation reflects a graded scepticism influenced by scientific reliability and procedural integrity.

[40] Ratanlal & Dhirajlal, *The Law of Evidence* 381–85 (27th ed. 2016).
[41] Id.
[42] Chennadi Jalapathi Reddy v. Baddam Pratapa Reddy, (2019) 14 SCC 220 (India).
[43] State of Maharashtra v. Damu Gopinath Shinde, (2000) 6 SCC 269 (India).

C. Evidentiary Value and Practical Limitations

1. Scientific Fallibility and Subjectivity

Methodological uncertainty is one of the main restrictions of forensic expert opinion. Conventional methods of forensic analysis Handwriting analysis, visual pattern matching, and toolmark comparison are not empirically confirmed and not measured in error rates. It is emphasized by scholars that these approaches are largely based on subjective interpretation, which can lead to the presence of cognitive bias and the false feeling of certainty.[44]

This scientific fragility justifies judicial insistence on corroboration and independent evaluation.

2. Institutional and Infrastructural Weaknesses

The structural inadequacies of the Indian forensic system are always recorded in socio-legal literature. Delays in laboratories, obsolete machinery, insufficiently trained professionals and absence of accreditation systems are the major contributors to forensic inaccuracies and the loss of evidentiary quality of samples, resulting in sample degradation and contamination.

Besides, the fact that state-controlled forensic labs are mostly dominant, questions the aspect of fair play especially in prosecutions related to politics. The suspicion of partisanship among courts and the ease of assuming the impartiality of government laboratories are the main reasons why private expert evidence is often distrusted because of the fear of partisanship, yet the neutrality of the latter is not empirically certain.

3. Procedural Lapses and Chain of Custody Failures

Scientifically reliable methods like DNA profiling also fail to deliver probative power when safety measures of the procedure are violated. The sample integrity is impaired by poor evidence collection, insufficient sealing, insufficient documentation, and exposure to environmental factors. Courts have reiterated a number of times that forensic reliability cannot be done without adherence to procedures. Such realities play a major role in influencing judicial shyness to use forensic reports only.

[44] Isha Ananda, *Admissibility of Expert Opinion in the Court of Law*, 3.2 J. Crim. L. & Just. 277 (2023).

D. Critical Evaluation

The socio-legal environment also demonstrates that judicial skeptical approach to forensic expert opinion is not just doctrine-conservatism, it is an understandable reaction to scientific insecurity, institutional vulnerability and rights-related issues. Nonetheless, their persistent involvement of homogenous scepticism does not appreciate further development in scientifically valid methods like DNA profiling.

An evidentiary method more differentiated, in the sense of giving more weight to empirically sound procedures and taking a reserved view of subjective procedures would be more consistent with the development of science and the legal reasoning process. In addition, forensic infrastructure, accreditation, and procedure training is necessary to increase judicial trust in forensic evidence.

RESEARCH METHODOLOGY

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Doctrinal Legal Research

The first one is the doctrinal research, which is a systematic examination of legislative documents, judicial rulings, and other legal commentaries. The research paper studies the Section 45 of the Indian Evidence Act[45] and applicable provisions of Code of criminal procedure, 1973 and other associated acts and legislations of forensic evidence. The cases of Supreme Court and High Courts are examined to follow the development of judicial precedents on admissibility, corroboration and weight of evidence of expert opinion.

Doctrinal research is particularly appropriate for this study as the evidentiary value of forensic science is fundamentally shaped by judicial interpretation and statutory construction. This

[45] Indian Evidence Act, 1872, § 45 (India).

method allows evaluation of legal reasoning, identification of doctrinal inconsistencies, and assessment of emerging judicial trends.

Socio-Legal Analysis

To supplement the doctrinal analysis, the study applies a socio-legal approach to research the institutional and practical issues that influence the forensic reliability. The use of scholarly materials, forensic science research and empirical findings are applied to evaluate infrastructural shortcomings, procedural failures, laboratory backlog, shortcomings in training experts and concerns over neutrality in the forensic institutions.

This method is warranted because forensic evidence does not exist in a completely legal vacuum, the credibility is strongly conditioned by systematic facts of evidence gathering, maintenance, scientific control.

Qualitative Case Law Analysis

The research further employs qualitative case analysis as a qualitative research method to examine how the various disciplines of forensic investigations like handwriting examination, fingerprint identification, DNA profiling, ballistic evidence and medical opinion are evaluated by the court. The study quantifies the degree to which courts use homogenous scepticism in comparison to trends of scientific reliability differentials by comparing judicial treatment across techniques.

Use of Secondary Sources

The research is based on the reliable academic databases like HeinOnline, SCC Online, and peer-reviewed journals like the Journal of Criminal Law and Justice and the International Journal of Law, Management and Humanities. Comments on the evidence laws in standard form are applied to give doctrinal background.

Methodological Justification

Such an integration of doctrinal and socio-legal approach guarantees normative and practical knowledge about forensic evidence. The legal principles that guide expert opinion are clarified by doctrinal analysis and institutional factors that generate judicial caution are identified by the

socio-legal enquiry. A combination of these approaches allows achieving a balanced assessment of the evidence of forensic experts in statutory, judicial, and social contexts.

ARGUMENTATION & CRITICAL ANALYSIS

A. Non-Conclusive Nature of Expert Opinion: A Necessary Safeguard or Judicial Over-Caution?

Section 45 of the Indian Evidence Act, 1872[46] merely renders expert opinion relevant and does not elevate it to the status of substantive proof. Indian courts have consistently reinforced this position by holding that forensic expert testimony is inherently corroborative and advisory in nature.

In *Murari Lal v. State of Madhya Pradesh*, Supreme Court warned that expert evscepticisma flimsy kind of evidence and must in most cases be corroborated before being relied upon, the jurisprudence of this is clearly based on judicial prudence and scepticism of the inferential science findings.[47]

Such caution is warranted on the side of fairness. Forensic opinion can be associated with probabilistic reasoning, methodological assumptions, and the interpretation of humans. The handling of evidence, contamination or expert bias can cause a great difference in the conclusions. Considering such weaknesses, the use of expert evidence as non-binding comes as a beneficial means of ensuring that there are no wrongful convictions, especially in a criminal justice system that has already been marred by inefficiencies in investigations.

However, this doctrinal conservatism increasingly clashes with the scientific maturation of certain forensic techniques. DNA profiling, for instance, operates on statistical probability models capable of establishing identity with near-certainty when proper protocols are followed. The Supreme Court itself acknowledged the powerful evidentiary value of DNA evidence in *Mukesh v. State (NCT of Delhi)* recognising it as a reliable investigative tool capable of conclusively linking accused persons to crime scenes.[48] Yet, despite such recognition, courts

[46] Indian Evidence Act, 1872, § 45 (India).
[47] Murari Lal v. State of Madhya Pradesh, (1980) 1 SCC 704 (India).
[48] Mukesh v. State (NCT of Delhi), (2017) 6 SCC 1 (India).

continue to treat DNA evidence under the same corroborative framework as subjective forensic methods such as handwriting analysis.

Nonetheless, this conservative doctrinaire is beginning to go against a scientific maturation of some forensic practices. As an example, the DNA profiling process is based on statistical probability models that can attain identity with a high degree of near-certainty provided the relevant protocols are adhered to. Mukesh v. In California and the fact that DNA evidence has strong evidentiary value even in the Supreme Court. State (NCT of Delhi), having acknowledged that it is a useful tool of investigation that can conclusively implicate persons accused of crimes at a crime scene.[49] But though acknowledging that, courts still, within the same corroborative category, subject DNA evidence to the same examination as the subjective forensic techniques like handwriting analysis.

This uniform scepticism raises concerns of judicial inertia in adapting evidentiary standards to scientific progress. While caution is necessary, failure to recalibrate legal treatment of highly reliable forensic technologies risks undermining the truth-finding function of criminal adjudication.

B. Judicial Caution Versus Scientific Advancement

The dispute between legal conservatism and forensic innovation indicates a more general epistemological dispute between law and science. Legal adjudication has conventionally given precedence to human testimony, cross-examination and storytelling whereas forensic science depends on empirical readings, probability and reproducibility.

The inability of Indian courts to allow all forensic evidence to be corroborated still seems to be rooted in historical events of unreliable expert evidence as well as inherent inefficiencies in the Indian forensic laboratory. The existing academic literature records institutional failures such as lab backlogs, insufficient training, lack of accreditation criteria, and procedural loopholes that regularly undermine the reliability of scientific evidence. These facts explain why judicial bodies are unwilling to uplift scientific evidence to traditional evidence.

However, with the rise of science, the situation has changed entirely in terms of reliability. There is a tendency toward giving more probative weight to scientifically validated methods

[49] Mukesh v. State (NCT of Delhi), (2017) 6 SCC 1 (India).

of international law, especially DNA profiling. However, Indian jurisprudence still is largely opposing a differentiated evidentiary standard.

This hesitation indicates a certain fear of scientific absolutism - the courts leaving the finding of facts to the experts. However, the inflexible scepticism toward even empirically highly effective methods exposes the danger of bringing about evidentiary underutilisation in which the sound science is underestimated because of a general mistrust. Therefore, the most important issue is how to strike a balance between judicial review and the scientific advancement, without foolishly trusting the forensic authority and being suspicious of all expert evidence.

C. Differential Evidentiary Weight of Forensic Techniques: The Case for a Calibrated Approach

A central weakness of current Indian evidentiary practice lies in its failure to differentiate between forensic disciplines based on scientific reliability. Handwriting analysis, toolmark comparison, and visual pattern recognition lack empirical validation and measurable error rates. These techniques are highly susceptible to subjective interpretation and cognitive bias.

In contrast, DNA profiling operates on statistical probability frameworks capable of near-certain identification when properly conducted. Treating both categories under identical corroborative standards reflects a legal fiction that all forensic science is equally fallible.

Scholars increasingly advocate for a differentiated evidentiary framework wherein probative value corresponds to scientific validation, reproducibility, and methodological transparency.[6] Under such a model:

•Subjective forensic techniques would require strong corroboration

•Scientifically robust techniques would warrant higher evidentiary weight

• Procedural compliance would remain essential across disciplines

Adopting calibrated evidentiary standards would enhance truth-finding while preserving judicial oversight and rights protections.

D. Critical Synthesis

The non-conclusive nature of expert opinion under Section 45 remains a crucial safeguard within India's imperfect forensic ecosystem. Judicial scepticism protects against miscarriages of justice arising from flawed science, institutional bias, and procedural lapses. However, continued uniform distrust fails to reflect evolving scientific reliability.

A balanced evidentiary paradigm must:

1. Preserve judicial independence
2. Recognise empirical reliability differences
3. Enforce procedural integrity
4. Uphold constitutional safeguards

Without such recalibration, Indian courts risk either scientific absolutism or scientific underutilisation—both of which undermine justice delivery.

RECOMMENDATIONS

A. Adoption of Differentiated Evidentiary Standards

The Indian courts are to stop being uniformly sceptical of forensic expert opinion, and be selective on the basis of scientific reliability. The empirically tested forensic techniques should be given a greater probative value especially DNA profiling, with intense adherence to procedural compliance. On the other hand, subjective means like handwriting analysis must still be highly corroborated. This kind of differentiation would fit the evidentiary practice with the scientific progress and maintain the judicial control.

B. Establishment of National Forensic Accreditation Authorities

An accreditation framework of forensic standards should be established to harmonise forensic practices, accredit laboratories and control the qualification of experts. The mechanisms of accreditation would guarantee homogeneity of scientific standards, reduce the errors of science, and increase judicial credibility of forensic reports.

C. Strengthening Chain of Custody and Procedural Safeguards

There should be clear law in the collection, preservation, transportation and documentation of forensic evidence. More rigorous implementation of chain-of-custody measures would go a long way in minimizing risks of contamination and procedural oversights, which are now degrading the reliability of forensic work.

D. Institutional Independence of Forensic Laboratories

The role of forensic labs should be the independent scientific organization and not the prosecutorial departments. The structural independence would help decrease the bias issue and increase the objectivity and fidelity of forensic analysis.

E. Judicial and Investigative Capacity Building

Institutionalisation of specialised forensic training programmes to judges, prosecutors and investigators is required. With increased scientific literacy, the courts could better scrutinized expert procedures, error levels and limitations on evidence.

F. Constitutional Regulation of Emerging Forensic Technologies

The laws that regulate the work of DNA database systems, biometric surveillance, and sophisticated forensic systems should include severe privacy controls, proportionality, and judicial approvals of legislations. This would ensure that this is not misused, and legitimate scientific investigation is allowed.

CONCLUSION

Forensic science has now turned out to be an essential part of modern criminal adjudication and the criminal courts are now able to resolve complicated technical issues that cannot be answered by the normal judicial knowledge. Section 45 of the Indian evidence act 1872[50] gives the statutory basis to admitting expert opinion but its application has always been restricted by the judicial interpretation to acting as supporting and advisory evidence rather than as conclusive proof.

[50] Indian Evidence Act, 1872, § 45 (India).

This cautious judicial approach is justified by scientific fallibility, institutional deficiencies, procedural lapses, and constitutional concerns surrounding bodily autonomy and privacy. Traditional forensic techniques lacking empirical validation further necessitate heightened scepticism. However, continued application of uniform distrust fails to adequately reflect advances in scientifically reliable methods such as DNA profiling.

The key dilemma is the conflict between evidentiary prudence and the development of science. Although excessive confidence in the criminal trial as the finder of truth may be detrimental to the principles of justice and human rights, on the other hand, too much scepticism may cause instances of miscarriages of justice and the violation of human rights. The most consistent way to go is a reformed evidentiary regime that is based upon differentiated scientific reliability, institutional integrity, procedure rigor, and constitutional protections. Indian courts can improve the process of criminal justice by re-setting the way forensic expert opinions are handled in order to improve the accuracy and fairness of their decision.

Ultimately, the future of forensic evidence in India depends not on rejecting science nor surrendering to it, but on integrating scientific knowledge within a robust legal framework that preserves judicial independence, protects fundamental rights, and advances substantive justice.

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