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FORENSIC EVIDENCE AND ITS ADMISSIBILITY IN COURTS; A MEDICO LEGAL PERSPECTIVE

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ABSTRACT

Modern criminal investigations now rely heavily on forensic evidence, which bridges the gap between legal processes and medical science. Although it plays a crucial role in establishing facts, identifying offenders, and upholding justice, its admissibility in court presents difficult medico-legal issues. The duties of forensic and medical professionals, the moral commitments to maintain the integrity of the evidence, and the legal requirements necessary to properly assess such evidence are all included in the medico-legal dimension. The legal foundation for expert testimony in India is provided by the Indian Evidence Act of 1872 and the Code of Criminal Procedure of 1973; however, issues with forensic procedure standardisation, chain of custody, and reliability still exist. The types of forensic evidence, the legal rules governing their admissibility, and the medico-legal issues that come up in real-world applications are all critically examined in this paper. It also looks at past court rulings, compares different viewpoints, and suggests changes to improve the relationship between forensic science and the law. The study highlights the necessity of a strong medico-legal framework by examining the legal and ethical aspects. This will guarantee that forensic evidence is a trustworthy tool of justice without sacrificing ethical or scientific standards.

KEY WORDS; Medico legal, Forensic, Evidence, Admissibility, Courts, Ethical Dimention, Doctors.

INTRODUCTION

Forensic evidence is now essential to contemporary criminal justice. The ability to precisely establish facts has caused a shift in reliance from traditional witness testimony to scientific methods as crimes become more complex. DNA profiling, toxicology reports, autopsy results, ballistic examinations, and newer digital forensic techniques are all examples of forensic evidence that can be used to definitively connect suspects to criminal activity. The medico-legal dimension of evidence evaluation, however, arises from the fact that its dependability is contingent not only on scientific accuracy but also on compliance with legal and ethical requirements. In addition to making sure that scientific protocols are strictly adhered to, medico-legal experts who are frequently physicians, pathologists, or qualified forensic scientists also offer testimony that the courts can use to make well-informed decisions. According to Section 45 of the Indian Evidence Act, 1872, their opinions are regarded as "expert evidence," allowing judges to assess the value of specialised knowledge in establishing a case's facts. The 1973 Code of Criminal Procedure also specifies how to get expert testimony and medico-legal reports, with a focus on the accused's rights and procedural protections. There are still issues in spite of these clauses, especially with regard to the

weight and admissibility of forensic evidence in court. The chain of custody, which guarantees that evidence gathered at a crime scene is kept safe and properly documented until it is presented in court, is one of the most important medico-legal issues. Even if the evidence is scientifically sound, any flaw in this procedure could make it inadmissible.[644] The judicial process is directly impacted by ethical duties that are essential to medico-legal practice, such as upholding confidentiality, avoiding conflicts of interest, and guaranteeing unbiased reporting. In India, judicial scrutiny has progressively changed to strike a balance between protections against abuse and the admissibility of forensic evidence. The limitations of some scientific methods, especially narco-analysis, polygraph tests, and brain mapping, have been made clear by landmark cases like Selvi v. State of Karnataka (2010), which emphasise that evidence gathered under duress or without consent cannot serve as the foundation for conviction. The global concern to ensure that only trustworthy and scientifically validated evidence is admitted in courts is highlighted by comparative legal perspectives, such as the Daubert standard in the United States. The objectives of this paper are to investigate the different kinds of forensic evidence, assess the legal framework that controls their admissibility, and look at the medico-legal difficulties that arise when using scientific methods in court. The study aims to find weaknesses in the current system and suggest changes that can improve the medico-legal interface by examining court decisions, procedural rules, and ethical commitments. The study concludes by emphasising that although forensic evidence improves the precision of criminal justice, its usefulness depends on strict adherence to legal and scientific norms.[645]

FORENSIC EVIDENCE AND THE MEDICO LEGAL SIGNIFICANCE

In its broadest definition, forensic evidence includes any scientific data or documents that can be used in court to prove facts relevant to criminal or civil cases. The Latin word forensis, which means "of the forum" or "pertaining to courts," is the root of the word "forensic," emphasising its close connection to legal procedures. Forensic evidence bridges the gap between scientific knowledge and judicial decision-making in modern criminal justice, allowing courts to determine the truth more precisely than they could with just testimonial evidence. [646]There are various types of forensic evidence, each with unique medico-legal implications they are DNA and Biological Evidence: DNA profiling has transformed criminal investigations by enabling highly accurate identification of suspects or victims. To determine genetic matches, biological samples like blood, hair, saliva, and semen can be examined. To prevent contamination and preserve the integrity of the evidence, medico-legal specialists make sure that samples are gathered, stored, and examined in accordance with stringent laboratory procedures. 2. Toxicology Reports: In situations involving poisoning, drug abuse, or substance-related fatalities, toxicological testing is crucial. Forensic toxicologists provide vital evidence for criminal and civil liability by determining the presence, concentration, and effects of chemicals. Forensic toxicologists provide vital evidence for criminal and civil liability by determining the presence, concentration, and effects of chemicals. Toxicology is a fundamental medico-legal field since accurate interpretation necessitates medical understanding of pharmacodynamics and pharmacokinetics. 3. Autopsy and Post-Mortem Reports: Medico-legal autopsies determine the cause, manner, and time of death. Forensic pathologists prepare post-mortem reports, which are used as primary evidence in investigations into suspicious deaths, homicides, and accidental deaths. These reports' dependability depends on careful review, appropriate documentation,

[644] P. N. Chatterjee, Forensic Medicine and Toxicology, 16th ed. (CBS Publishers & Distributors 2020).
[645] R. K. Gupta, Medico-Legal Aspects of Forensic Science, 2nd ed. (LexisNexis 2018).
[646] Indian Evidence Act, 1872, No. 1, Acts of Parliament, 1872 (India).

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and compliance with legal requirements. . Ballistics and Firearms Analysis: The weapon used, trajectory, and firing distance can be determined through forensic analysis of bullets, cartridge cases, and firearms. Ballistics specialists testify regarding the suitability of bullets for particular weapons, providing vital connections between criminal activity and suspects. 5. Evidence from fingerprints and impressions Unique identifiers include tyre marks, tool impressions, footprints and fingerprints. To match evidence with people or objects, forensic specialists examine these patterns. Strict adherence to collection and storage procedures is necessary for the preservation of such evidence in order to avoid contamination or deterioration.[647] Evidence of fingerprints and impressions Tire marks, tool impressions, footprints and fingerprints are all distinct identifiers. To match evidence to people or objects, forensic specialists examine these patterns. Strict compliance with collection and storage procedures is necessary for the preservation of such evidence in order to avoid contamination or deterioration. 6. Digital and Cyber Forensics: Digital evidence has become more important as cybercrime has increased. In order to recover deleted files, track communications, and create electronic links, computers, mobile devices, and online activity logs are analysed. This area of forensic science requires a solid grasp of legal admissibility requirements in addition to technical proficiency.

The dual duty of guaranteeing both scientific accuracy and legal dependability gives rise to the medico-legal dimension of forensic evidence. In addition to being technical assessors, forensic specialists are answerable to the courts for their interpretations and opinions. A key component of medico-legal practice is adherence to ethical duties, such as impartiality, confidentiality, and avoiding conflicts of interest. Additionally, courts frequently use medico-legal reports to settle cases, so the reliability of the expert testimony is essential to ensuring fair results. Even with new technology, forensic evidence is not always reliable. Reliability may be jeopardised by mistakes made during sample collection, laboratory analysis, or interpretation. Procedure errors, laboratory contamination, and chain of custody violations can make otherwise admissible evidence inadmissible. Courts must also critically assess whether the evidence satisfies the requirements of relevance and probative value, striking a balance between scientific certainty and judicial standards. Effective use of forensic evidence in criminal justice requires a basic understanding of it. Its various forms, medico-legal importance, and intrinsic difficulties emphasise the need for exacting scientific procedures as well as stringent adherence to moral and legal requirements. Although forensic science has made great strides in being incorporated into Indian legal proceedings, this integration's efficacy is contingent upon standardised procedures, expert competence, and judicial discretion.[648] The legal framework that governs the admissibility of forensic evidence in courts a crucial link between science and law will be discussed in the upcoming chapter.

LEGAL FRAMEWORK FOR ADMISSIBILITY OF FORENSIC EVIDENCE

Since it establishes whether scientific discoveries can affect court decisions, the admissibility of forensic evidence in courts is a crucial medico-legal issue. Even though forensic evidence has the power to greatly improve or impair a case, its evidentiary value depends on compliance with legal requirements, statutory provisions, and established procedural safeguards. The Indian Evidence Act, 1872 (IEA), the Code of Criminal Procedure, 1973 (CrPC), and court rulings that strike a balance between scientific precision and legal equity are the main sources of the

[647] Ministry of Health & Family Welfare, National Guidelines on Forensic Laboratories, Government of India, 2019, available at: https://main.mohfw.gov.in.

[648] Bureau of Police Research and Development, Forensic Science Laboratory Standards and Accreditation Guidelines, 2021.

legal framework that governs forensic evidence in India. The 1872 Indian Evidence Act Forensic reports and other expert testimony are admissible under Section 45 of the Indian Evidence Act. It asserts that the viewpoint of an expert in a field is significant when the court must make a decision on a scientific issue. This includes forensic scientists, medico-legal experts, and other professionals. The Act allows expert testimony to help the court understand technical issues beyond the scope of ordinary judicial knowledge, and it makes a distinction between fact evidence (direct observations) and opinion evidence (interpretation of facts). According to Section 45, the expert's opinion is pertinent but not definitive; the court still has the authority to assess the expert's reliability and probative value. Expert testimony and supporting evidence, like witness testimony, can be considered by courts. 1973's Code of Criminal Procedure The steps involved in gathering and presenting forensic evidence are described in the CrPC. Particularly pertinent are Sections 53, 164, and 293: In order to ensure accurate documentation of injuries and medical conditions, Section 53 requires that accused individuals be examined medically when necessary for the purpose of investigation. In situations where medical-legal evidence may be included in the case file, Section 164 regulates the recording of confessions and statements. In order to institutionalise medico-legal procedures, Section 293 gives courts the authority to order forensic or medical examinations when needed. These clauses guarantee procedural proPrinciples and the Judicial Approach Courts in India have increasingly stressed the need for prudence when admitting forensic evidence. Expert testimony is valuable, but the court is aware of its limitations, especially when it comes to new or contentious scientific methods. In Selvi v. State of Karnataka (2010), the Supreme Court made it clear that due to their violation of Articles 20(3) and 21 of the Constitution, involuntary narco-analysis, polygraph tests, and brain mapping cannot be used as evidence against an accused person. This ruling upheld the rule that admittance must strike a balance between fundamental rights and scientific utility.tections to preserve the admissibility of forensic evidence while facilitating its methodical collection. Additionally, the courts have emphasised the significance of procedural integrity, relevance, and dependability. To avoid a miscarriage of justice, the courts strictly enforce chain of custody procedures, independent verification, and laboratory standards in cases involving DNA evidence. Clear documentation of the procedures, outcomes, and limitations must be included with forensic reports. Standards to govern the admissibility of scientific evidence have been developed by legal systems around the world. According to the Daubert standard (USA, 1993), scientific evidence must be trustworthy and pertinent, with a focus on peer review, error rates, and widespread acceptance within the scientific community. Although it was older, the Frye standard (USA, 1923) concentrated on "general acceptance" of methods. By encouraging a cautious and critical approach to the evaluation of forensic evidence, these standards have an indirect impact on Indian courts. Obstacles to Legal Admissibility Notwithstanding legal and legislative frameworks, difficulties still exist: Lack of uniformity: The infrastructure, methodology, and accreditation of forensic labs in India differ, which compromises their dependability.[649] Chain of custody lapses: Evidence may become inadmissible if it is handled improperly during collection, storage, or transportation. Courts must evaluate the credentials, independence, and possible conflicts of interest of experts in order to determine whether they are biassed or incompetent. Changing science: As technology advances more quickly than the law can keep up, admissibility standards become ambiguous. While guaranteeing that courts maintain the authority to judge credibility and probative value, India's forensic evidence legal framework

[649] M. D. Singh, "DNA Evidence in Indian Judicial System: Legal and Ethical Perspectives," Journal of Indian Law & Society, vol. 8, 2020, pp. 78–102.

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offers a systematic method for expert testimony. The statutory framework is composed of Section 45 of the IEA and pertinent CrPC provisions, which are supplemented by judicial review and comparative analysis. Nevertheless, gaps in standardization, procedural integrity, and adaptation to new technologies present ongoing challenges. As will be covered in later chapters, addressing these problems calls for a trifecta of strong medico-legal procedures, judicial awareness, and legal reforms.

MEDICO LEGAL DIAMENTIONS AND CHALLENGES

At the nexus of medicine, science, and law, forensic evidence is more than just the result of scientific research. The duties, ethical commitments, and procedural responsibilities of forensic and medical professionals whose conclusions may have a direct bearing on court decisions are all included in the medico-legal dimension.[650] In this situation, forensic evidence Forensic evidence is more than just the product of scientific research at the intersection of law, science, and medicine. The medico-legal dimension encompasses the obligations, moral pledges, and procedural responsibilities of medical and forensic experts whose findings could directly influence court rulings. Courts consider the admissibility and dependability of forensic evidence in this case, making it a technical and legal tool. serves as both a technical and a legal tool, with courts examining its reliability and admissibility. Providing unbiased viewpoints free from the influence of the case's parties or the investigating authorities is known as objective reporting. To render just decisions, courts depend on this impartiality. Court testimony is the presentation of evidence in a clear and understandable manner to juries and judges who might not be technical experts while remaining impartial as a professional. Ethical Duties There are important ethical considerations in medicolegal practice: Confidentiality: Information about patients or victims must be protected. Unauthorised disclosure may be a breach of Article 21 constitutional protections and privacy rights. Preventing Conflicts of Interest: Professionals should not have financial or personal interests that might sway their testimony. Consent: Informed consent is morally and legally required in situations involving intrusive procedures or scientific tests (such as narco-analysis or DNA sampling). Impartiality: Experts must fend off pressure to change or exaggerate findings from litigants or law enforcement. Justice and professional credibility can be harmed by ethical transgressions. Despite having defined duties, medico-legal practice has many obstacles to overcome: Chain of Custody : Inadmissibility may be jeopardised if evidence is handled improperly from the crime scene to the laboratory. Courts have frequently declared evidence void when protocols are broken or documentation is lacking. Errors in Analysis: Inaccurate conclusions may arise from technical or human error in laboratories, such as contamination or incorrect interpretation of data. Insufficient Training: The dependability of reports may be impacted by forensic staff members' lack of ongoing training and professional development. Resource Limitations: Inadequate infrastructure, antiquated equipment, and a lack of personnel plague many forensic labs in India, impeding the timely and precise processing of evidence. Emerging Technologies: Interpretation issues arise from new forensic tools like facial recognition, digital forensics, and sophisticated DNA sequencing. It may be difficult for courts to assess their credibility, admissibility, and possible moral ramifications. Case Studies Emphasising Difficulties Examples from the Indian legal system show how medico-legal issues have a big influence on justice: Postmortem mistakes have resulted in conflicting interpretations of the cause of death in some criminal cases, which has caused appeals and delays in proceedings. Examples Illustrating Difficulties Examples from the Indian legal system show

[650] M. D. Singh, "DNA Evidence in Indian Judicial System: Legal and Ethical Perspectives," Journal of Indian Law & Society, vol. 8, 2020, pp. 78–102.

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how medico-legal issues have a big influence on justice: Postmortem mistakes have resulted in conflicting interpretations of the cause of death in some criminal cases, which has caused appeals and delays in proceedings. In some cases, improper handling of DNA samples has led to acquittals because of procedural errors or inadmissibility. In Selvi v. State of Karnataka (2010), the limitations of specific scientific tests (such as polygraphs, brain mapping, and narco-analysis) were emphasised, along with the need for ethical protections and informed consent. These cases highlight the crucial relationship between science and the law: if medico-legal protocols and ethical standards are not strictly adhered to, even scientifically sound evidence may not pass judicial scrutiny. The Value of Standardization Standardization is crucial to reducing medico-legal issues: Forensic laboratory accreditation in accordance with ISO or NABL standards. uniform procedures for gathering, preserving, and analyzing evidence. definite rules for courtroom presentations and expert reporting. ongoing professional development to stay up to date with the latest advancements in forensic technology.[651] Forensic evidence's medico-legal component is crucial and intricate. To guarantee that forensic evidence is trustworthy, admissible, and ethically gathered, experts' roles, ethical commitments, and procedural duties are essential. The necessity of standardized procedures, professional training, and judicial awareness is highlighted by issues like chain of custody violations, procedural errors, and emerging technologies. In order to successfully incorporate forensic science into the legal system and ensure justice without sacrificing ethical or scientific standards, these issues must be resolved.

JUDICIAL SCRUTINY AND PRECEDENTS ON FORENSIC EVIDENCE

Forensic evidence's credibility and admissibility in court depend heavily on the judicial assessment of the evidence. Even though forensic science offers unbiased perspectives on criminal activity, courts still have the final say over whether or not such evidence satisfies requirements for relevance, dependability, and procedural integrity. Thus, judicial review acts as a crucial checkpoint, guaranteeing that scientific data is construed and used in a way that is consistent with justice and the law. Courts' Function in Assessing Forensic Evidence Courts serve as arbiters, weighing scientific discoveries against constitutional rights and procedural protections. Judges assess the chain of custody of the evidence, the expert's credibility, and the precision of the techniques employed.[652] Although the Indian Evidence Act's Section 45 acknowledges the value of expert opinions, it does not make them definitive. Judges determine if the evidence is: Relevant: Does it have a direct bearing on the case's facts? Dependable: Were standard protocols followed, and are the methods scientifically validated? Fairly Obtained: Were moral and legal principles upheld during its gathering and examination?

A number of Indian court rulings demonstrate the meticulous examination given to forensic evidence: In the 2010 case Selvi v. State of Karnataka, [653]the Supreme Court declared that involuntary brain mapping, polygraph, and narco-analysis tests were unconstitutional under Articles 20(3) and 21 of the Constitution. The ruling highlighted the relationship between medico-legal practice and constitutional rights by emphasizing that such tests cannot be admitted as evidence unless consent is voluntarily given. In State of Maharashtra v. Mohd. Yakub (2007), the court ruled that firearm reports and ballistic evidence are only admissible if they are gathered, stored, and

[651] Ministry of Home Affairs, Government of India, Guidelines for Collection, Preservation & Transportation of Forensic Evidence in Sexual Assault Cases for Investigation Officers and Medical Officers, Directorate of Forensic Science Services, available at: https://dfs.nic.in/pdfs/IO%20-Forensic%20evidence-Guidelines%20for%20%20IO.pdf.

[652] National Forensic Sciences University, Affiliation Norms, available at: https://beta.nfsu.ac.in/uploads/Affiliation%20Norms.pdf.

[653] Selvi v. State of Karnataka, (2010) 7 SCC 263 (India).

examined in accordance with accepted forensic standards. Regardless of the scientific validity, any procedural error can reduce the evidentiary value. In State of Maharashtra v. Mohd. Yakub (2007),[654] the court ruled that firearm reports and ballistic evidence are only admissible if they are gathered, stored, and examined in accordance with accepted forensic standards. Regardless of the scientific validity, any procedural error can reduce the evidentiary value. DNA evidence was admitted in Nayana v. State of Kerala (2013) to establish biological relationships; however, before granting probative weight, the court carefully considered the methodology, documentation, and independent verification of the results. These cases highlight the judiciary's responsibility to make sure that forensic evidence supports fair trial principles rather than takes their place. Similar caution is reflected in judicial standards for forensic evidence around the world: Merrell Dow Pharmaceuticals v. Daubert (USA, 1993): The "Daubert standard," which was established by the US Supreme Court, mandates that scientific evidence be trustworthy, pertinent, and subject to peer review. Judges serve as gatekeepers, preventing verdicts from being influenced by faulty scientific evidence. In R v. Doheny (UK, 1997), the court highlighted judicial discretion in interpreting scientific findings by stressing that expert testimony is advisory and that the jury still has the duty to assess its significance. By indirectly educating Indian courts, these comparative frameworks promote judicial prudence, methodological examination, and ethical adherence when assessing forensic evidence. The administration of justice and forensic science are critically filtered by judicial scrutiny. Indian courts, which frequently take inspiration from comparable international standards, have shown a dedication to assessing relevance, dependability, and ethical adherence. Even though forensic evidence can greatly help with fact-finding, its admissibility is contingent upon strict adherence to legal requirements, methodological precision, and judicial discretion. Retaining public trust in the criminal justice system requires constant and knowledgeable judicial review.[655]

REFORMS AND RECOMMENDATIONS

Even though forensic evidence is now essential in criminal justice, specific reforms are required to close gaps in institutional infrastructure, judicial knowledge, and medico-legal procedures. By ensuring that forensic evidence is ethically and reliably gathered, strengthening the link between science and law raises the legitimacy of court decisions. Forensic Laboratory Standardization The standardization and accreditation of forensic labs is a crucial reform. There are currently notable differences in the equipment, infrastructure, and procedural protocols among laboratories in India. Evidence analysis consistency can be guaranteed by ISO 17025 accreditation or National Accreditation Board for Testing and Calibration Laboratories (NABL) certification. Education and Career Advancement Forensic scientists, medico-legal specialists, and law enforcement officers must all pursue ongoing professional development. Training ought to include: updates on new developments in forensic technology, including digital forensics, biometrics, and sophisticated DNA sequencing. ethical obligations, such as confidentiality, informed consent, and unbiased reporting. Presentation abilities in the courtroom to successfully convey technical findings to juries and judges. Enhancing Chain of Custody Systems The chain of custody is still a common source of dispute for judges. Reforms ought to consist of: evidence that is digitally recorded and impenetrable, from gathering to presenting it in court. Secure storage methods and barcoding can stop contamination or loss. definite procedures for the exchange of evidence between courts, labs, and agencies. Enhancing the chain of custody protects forensic evidence's reliability and admissibility. Judicial and Legal Reforms Courts assessing

[654] State of Maharashtra v. Mohd. Yakub, (2007) 4 SCC 539 (India).

[655] Government of India, Ministry of Home Affairs, Modernization of Forensic Capabilities, available at: https://www.pib.gov.in/PressReleasePage.aspx?PRID=2003163.

novel scientific methods can be guided by the adoption of uniform admissibility standards akin to the Daubert standard. Programs for judicial sensitization can improve knowledge of forensic science and encourage critical evaluation of expert testimony. By outlining the responsibilities and restrictions of forensic experts, statutory guidelines for medico-legal reporting can help courts avoid ambiguity. Ethical supervision and public awareness Campaigns for professional and public awareness can emphasize how crucial ethical forensic practice is. Independent oversight committees for forensic labs can be established to keep an eye on compliance, look into mistakes, and suggest fixes. Accountability and public trust in the legal system are strengthened by such oversight.

CONCLUSION

By bridging the gap between scientific investigation and legal decision-making, forensic evidence has become a vital component of contemporary criminal justice. Its worth comes from its capacity to support or contradict assertions in court as well as from its capacity to offer unbiased, scientifically supported insights. The dual responsibility of scientific accuracy and adherence to legal and ethical standards is highlighted by the medico-legal dimension of forensic evidence. To guarantee that justice is carried out without jeopardizing their ethical or professional commitments, experts must gather, evaluate, and present evidence with diligence, objectivity, and transparency. A systematic foundation for the admissibility of forensic evidence is provided by the Indian legal system, principally through the Indian Evidence Act of 1872 and the Code of Criminal Procedure of 1973.[656] Expert testimony is recognized by Section 45 of the Evidence Act, and medico-legal examinations and reporting are governed by procedural provisions in the CrPC. Court precedents, such as seminal cases like Selvi v. State of Karnataka (2010), highlight informed consent, procedural justice, and constitutional protections while demonstrating the courts' cautious approach to new scientific methods. When assessing scientific evidence, comparative standards such as the Daubert standard in the US emphasize the significance of relevance, dependability, and peer validation. In India, difficulties still exist despite progress. The dependability and admissibility of forensic evidence may be jeopardized by variations in laboratory infrastructure, breaches in the chain of custody, human error, and the quick advancement of technology. Furthermore, in order to avoid abuse or exploitation, ethical considerations like confidentiality, impartiality, and informed consent necessitate ongoing attention. Even though judicial scrutiny is strong, it needs to be supported by changes to institutional oversight, professional training, and standardization.

[656] Indian Evidence Act, 1872, No. 1, Acts of Parliament, 1872 (India).