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BIOLOGICAL AND EVIDENTIARY LOOPHOLES IN MURDER AND RAPE TRIALS: A CRITICAL STUDY OF HOW LACK OF EVIDENCE ENABLES THE ESCAPE OF REAL CULPRITS IN INDIA

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ABSTRACT

The Indian criminal justice system, especially in murder and rape cases, is largely reliant on biological and forensic evidence for the proof of guilt beyond a reasonable doubt. Despite legislative progress, technological development, and judicial activism, a large number of such cases often end in acquittals, not necessarily on the grounds of the accused being innocent, but because of evidentiary gaps caused by biological decay, procedural errors, investigative neglect, and systemic failures. This research paper critically evaluates the biological and evidentiary gaps that vitiate the prosecution of murder and rape cases in India, thus allowing the real culprits to go scot-free. The paper uses a doctrinal and empirical methodology, scrutinizing legislative provisions, judicial precedents, limitations of forensic science, NCRB statistics, Law Commission reports³, and medico-legal practices. It contends that the failure to preserve, collect, analyze, and produce biological evidence such as DNA, blood, semen, hair, and tissue samples, in addition to the weakness of chain-of-custody systems and the phenomenon of hostile witnesses, weakens the evidentiary base of criminal trials. The paper also delves into how sociological factors, gender biases, investigative corruption, and the absence of forensic facilities contribute to evidentiary failure. Finally, the study recommends structural changes in forensic administration, proof requirements, police education, and judicial understanding of scientific proof to avoid miscarriages of justice and regain confidence in the criminal justice system.

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³ Law Comm'n of India, 185th Report on Review of the Indian Evidence Act, 1872 (2003)

INTRODUCTION

The assessment of criminal responsibility in murder and rape cases is the most extreme manifestation of state power, where the freedom, dignity, and life of citizens are put to risk. In India, the criminal justice system requires proof beyond reasonable doubt, which has its roots in the constitutional provision of the right to personal liberty under Article 21⁴ of the Indian Constitution. But the implementation of this requirement is highly problematic when trials are dependent on very weak biological and forensic evidence, which is often mishandled, contaminated, delayed, or simply not available. The irony of Indian criminal jurisprudence is that it is committed to scientific evidence but is unable to effectively conserve and present this evidence. This has led to a very high acquittal rate in serious crimes, especially rape and murder, where the failure of evidence not only leads to acquittal but also leads to social injustice and encourages crime.

The issue does not lie in isolated instances of investigative failures but is systemic in nature, including police inefficiency, forensic laboratory delays, the absence of qualified personnel, judicial doubts about the validity of scientific evidence, and socio-cultural hurdles that prevent victim cooperation. In rape cases, the deterioration of semen samples, delayed medical tests, and improper collection of vaginal swabs frequently make DNA evidence unusable, while in murder cases, the contamination of bloodstains, improper autopsies, and the failure to determine the cause of death conclusively undermine the prosecution's case. These problems are further exacerbated by the presence of hostile witnesses, coerced confessions, and circumstantial evidence that lacks forensic support. This paper argues that evidentiary failures not only violate the rights of victims but also undermine the truth-finding role of criminal trials.

CONCEPTUAL FRAMEWORK OF BIOLOGICAL EVIDENCE IN CRIMINAL TRIALS

Biological evidence is a crucial component of contemporary criminal investigations, acting as an impartial scientific resource that can establish a strong connection between the suspect and the crime scene or the victim. In the Indian scenario, biological evidence encompasses blood, semen, saliva, hair, skin tissue, bones, and bodily fluids, which are subject to the principles of forensic science and

⁴ The Constitution of India, art. 21

molecular biology. The inclusion of DNA profiling under Section 53A⁵ of the Code of Criminal Procedure, 1973, brought about a revolution by acknowledging the evidentiary value of genetic material in sexual offense cases. But mere recognition of biological evidence is not sufficient to ensure effective evidentiary results unless it is reinforced by strong collection, preservation, and analysis processes.

The vulnerability of biological evidence poses a special challenge, as biological evidence is extremely prone to the influence of environmental factors, microbial action, and human intervention. Inadequate storage conditions, such as the presence of heat or moisture, can cause irreversible damage to DNA samples, thus ruling out the possibility of forensic connection altogether. In the Indian context, crime scenes are often left unattended, thus allowing the possibility of contamination by onlookers, police, or media presence, thus adversely affecting the integrity of evidence. Moreover, the lack of uniform national guidelines for evidence handling results in varying practices, thus affecting the authenticity of forensic findings. The Supreme Court, while recognizing the evidentiary potential of DNA evidence, has consistently warned against blind acceptance of scientific opinions without scrutinizing the procedural aspects of evidence integrity.

BIOLOGICAL EVIDENTIARY FAILURES IN RAPE TRIALS

The problem of rape trials in India is a pressing example of biological evidentiary failure, where the prosecution of rape cases is dependent on the timely medical examination and documentation of the evidence. Despite the provisions of Section 164A⁶ of the CrPC, medical examinations of rape victims are often postponed because of the social stigma associated with rape, police indifference, or a lack of medical facilities. This leads to the loss of vital biological evidence, such as semen and epithelial cells, which are critical for DNA analysis. The National Crime Records Bureau⁷ has been recording low conviction rates in rape cases, which are directly related to evidentiary failures and not due to a lack of occurrence.

Judicial precedents like *State of Karnataka v. Manjanna* (2000)⁸ highlight the need for immediate medical examination, but compliance at the grassroots level is very poor. Moreover, the adherence to outdated and discredited practices like the “two-finger test” further erodes the evidentiary integrity.

⁵ The Code of Criminal Procedure, No. 2 of 1974, sec 53A(India)

⁶ The Code of Criminal Procedure, No. 2 of 1974, sec 164A (India)

⁷ Nat'l Crime Records Bureau, Crime in India 2022 (Ministry of Home Affairs, Gov't of India)

⁸ *State of Karnataka v. Manjanna*, (2000) 3 SCC 57 (India)

The Supreme Court in *Lillu v. State of Haryana* (2013)⁹ strongly disapproved of these practices, realizing their lack of scientific integrity. But the persistence of these practices indicates a deeper institutional resistance to forensic modernization. Furthermore, the forensic science laboratories in India are faced with serious capacity shortages, leading to immense delays in DNA testing, further eroding prosecutorial momentum and giving the accused an opportunity to take advantage of procedural delays.

BIOLOGICAL AND FORENSIC EVIDENTIARY FAILURES IN MURDER TRIALS

Murder trials in India are critically reliant on the determination of cause of death, time of death, manner of death, and the association of the accused with the actus reus through biological and forensic evidence. In spite of the theoretical strength of medico-legal jurisprudence, Indian courts are often faced with murder trials that fall apart due to flawed post-mortem examinations, tainted biological samples, and ambiguous forensic opinions. The post-mortem examination report, which is expected to be the backbone of murder trials, is often marred by ambiguous opinions, inadequate descriptions of injuries, and the absence of correlation between medical opinions and prosecution versions. The Supreme Court in the case of *Ram Narain Singh v. State of Punjab*¹⁰ held that a careless or cursory post-mortem examination can cause irreparable harm to the prosecution case, as courts are obligated to give the accused the benefit of doubt in the absence of conclusive medical opinion linking the accused to homicidal death.

Biological evidence like bloodstains, gunpowder residue, hair follicles, and tissue samples are often made inadmissible or unreliable because of improper collection and preservation. Crime scenes in murder cases are rarely cordoned off properly, resulting in contamination by police personnel, family members of the deceased, and onlookers. This results in the commingling of biological evidence, making it impossible to link forensic evidence to the accused. In the case of *State of Rajasthan v. Teja Ram*¹¹, the Court held that contamination of bloodstains seriously affects their evidentiary value and raises reasonable doubt. The lack of uniform crime scene management practices in Indian states further adds to this problem.

⁹ *Lillu v. State of Haryana*, (2013) 14 SCC 643 (India)

¹⁰ *Ram Narain Singh v. State of Punjab*, AIR 1975 SC 1727 (India).

¹¹ *State of Rajasthan v. Teja Ram*, (1999) 3 SCC 507 (India)

Another important deficiency in murder trials is the lack of ability to determine the exact time of death, which is necessary to confirm or refute alibis. The Indian forensic system is still heavily dependent on conventional methods like rigor mortis, post-mortem lividity, and body temperature, which are prone to environmental factors and lack scientific validity. Modern forensic science methods like entomology, biochemical analysis, and digital autopsy are still not developed due to a lack of expertise. As a result, the courts are often faced with divergent medical opinions, which casts doubt on the prosecution's certainty. This creates a situation where the guilty escape punishment.

CHAIN OF CUSTODY AND NEGLIGENCE BY THE POLICE

The chain of custody is one of the basic tenets of evidence law, which ensures that the biological evidence taken from the crime site or victim is not tampered with from the time of collection to the time of production in the court of law. In the Indian criminal justice system, the chain of custody is notoriously weak, with inadequate documentation, lack of accountability, and apathy. The biological evidence is often passed from one police station to another, or from one hospital to another, or from one forensic science laboratory to another, without adequate sealing, labeling, or documentation, thus providing an opportunity for contamination and substitution. The courts have held that if there are any gaps in the chain of custody, it would raise serious doubts about the authenticity of the evidence, as was held in the case of *Vijayee Singh v. State of Uttar Pradesh*.

Negligence on the part of the police is a decisive factor in the reduction of evidentiary reliability, especially in cases involving marginalized victims. The investigating police officers are often untrained in forensic science and view biological evidence as a mere formality rather than an investigative resource. The absence of photographs of the crime scene, the timing of sample collection, and the evidence log further reduces the evidentiary reliability of forensic evidence. Additionally, corruption and deliberate tampering with evidence, though hard to prove, are a disturbing fact in high-profile cases. The Law Commission of India, in its 239th Report¹², has clearly identified the inefficiency of the police and the lack of scientific training as major factors in the low conviction rates in serious crimes.

The effects of chain-of-custody violations also have broader implications, as they contribute to a loss of public confidence in the forensic sciences and the judicial system as a whole. As the courts are repeatedly faced with tainted or dubious evidence, the skepticism of judges towards forensic evidence

¹² Law Comm'n of India, 239th Report on Expeditious Investigation and Trial of Criminal Cases (2012)

tends to rise, leading to an increase in reliance on verbal testimony, which is also prone to intimidation and hostility.

HOSTILE WITNESSES AND THE COLLAPSE OF CORROBORATIVE EVIDENCE

The problem of hostile witnesses is one of the most important non-biological evidentiary breakdowns in murder and rape cases, which can render ineffective otherwise powerful biological evidence. Witnesses in India often retract their statements in view of threats, social pressure, or persuasion, thus reducing the prosecution's chances of proving motive, opportunity, and conduct. When biological evidence is inconclusive or weak, witness evidence becomes critical; but the fallibility of witness evidence often leads to acquittals. The Supreme Court in the case of *State of Uttar Pradesh v. Ramesh Prasad Misra*¹³ has recognized that hostile witnesses considerably weaken the truth-finding role of criminal trials.

The lack of a proper witness protection system is an added factor to this problem, despite the judicial directive in the case of *Mahender Chawla v. Union of India*¹⁴ to implement witness protection schemes. The fear of retribution deters witnesses from cooperating with prosecution claims, especially in instances of organized crime and powerful suspects. The reliance on biological evidence, already tainted by the lack of proper investigation, is insufficient to produce convictions. The combination of biological vulnerability and unreliable testimony is thus a recipe for failure that allows actual offenders to go unpunished.

STATISTICAL ANALYSIS AND EMPIRICAL EVIDENCE

The empirical evidence supports the contention that the failure of evidence rather than the absence of criminality is the reason for the high rate of acquittals in rape and murder trials. According to the data provided by the NCRB, the rate of conviction in rape and murder is substantially lower than the rate of case registration, establishing the prosecutorial failure. The studies carried out by the Bureau of Police Research and Development¹⁵ indicate that the average time taken for forensic analysis is

¹³ *State of Uttar Pradesh v. Ramesh Prasad Misra*, (1996) 10 SCC 360 (India)

¹⁴ *Mahender Chawla v. Union of India*, (2019) 14 SCC 615 (India)

¹⁵ Bureau of Police Research & Dev., *Status of Forensic Science Laboratories in India* (Gov't of India, 2021)

several months in most states, which has a critical impact on the trial. The result of the DNA analysis is often delayed to the point where the analysis of key witnesses becomes procedurally ineffective.

Analysis of the judgments passed by trial courts in various jurisdictions indicates a judicial trend: the courts show apprehension about the authenticity of biological evidence, and at the same time, they complain about the incompetence of the investigating agencies. The judicial observation about the incompetence of the investigating agencies reiterates the need for structural changes rather than procedural reforms. The observations made in the data indicate that unless forensic facilities and police training are improved together, the criminal justice system will continue to enable the escape of actual offenders on the plea of reasonable doubt.

JUDICIAL APPRECIATION OF BIOLOGICAL AND FORENSIC EVIDENCE IN INDIA

The Indian judiciary plays a crucial role in adjudging the evidentiary value of biological and forensic evidence as the final authority between scientific possibility and legal certainty. Although the judiciary has shown a growing appreciation for the probative value of DNA and forensic science, judicial appreciation is far from uniform, ranging from a guarded welcome to outright rejection. The Supreme Court of India in the case of *Mukesh v. State (NCT of Delhi)*¹⁶ in the Nirbhaya case held that DNA profiling is one of the most credible forms of evidence, sufficient to conclusively prove guilt if accompanied by an unbroken chain of custody. Yet, the same judicial bodies have often rejected forensic evidence on procedural grounds in other matters, thus establishing that scientific credibility alone is not enough unless accompanied by procedural soundness.

The trial courts, burdened with a large number of cases and lacking adequate scientific knowledge, tend to rely excessively on oral testimony despite difficulties in comprehending complex forensic analysis. This judicial practice inadvertently creates a situation that defies the evidentiary order conceptualized in modern criminal jurisprudence, wherein scientific evidence is expected to complement, or even replace, subjective oral testimony. The judicial views expressed in the *Santosh Kumar Singh v. State*¹⁷ through CBI case aptly demonstrate how the failure of the investigative agency to properly manage biological evidence may force the court to extend the benefit of doubt, even in instances of serious sexual violence.

¹⁶ *Mukesh v. State (NCT of Delhi)*, (2017) 6 SCC 1 (India)

¹⁷ *Santosh Kumar Singh v. State through CBI*, (2010) 9 SCC 747 (India)

COMPARATIVE JURISPRUDENCE: LESSONS FROM THE UNITED KINGDOM AND THE UNITED STATES

Comparative jurisprudence between the United Kingdom and the United States reveals the structural differences that lead to different conviction rates. In the United Kingdom, the Criminal Justice System is subject to strict forensic practices supervised by the Forensic Science Regulator. This ensures that evidence is collected on a standardized basis, with accredited forensic labs and responsible forensic professionals. The continuity of evidence and strict disclosure requirements eliminate the possibility of contamination and disputes over evidence. The courts in England use forensic expert testimony, which is well-documented, thereby eliminating the need for eyewitness testimony.

Likewise, the United States has institutionalized DNA evidence through legislation such as the DNA Identification Act and the creation of the Combined DNA Index System (CODIS). The U.S. Supreme Court has repeatedly affirmed the use of DNA evidence, as long as constitutional requirements are satisfied. Notably, DNA profiling has also brought about a paradigm shift in post-conviction exonerations, identifying wrongful convictions due to tainted evidence. Conversely, India does not have a national DNA database with standardized access procedures, despite legislative efforts such as the DNA Technology (Use and Application) Regulation Bill. The lack of institutionalized forensic governance in India leads to disparities in evidentiary results, allowing actual culprits to go unpunished.

BIOLOGICAL EVIDENCE, GENDER BIAS, AND SOCIO-LEGAL BARRIERS

Socio-legal conditions (for example, gender bias, victim blaming, and stigma) and biological evidence all interact with each other when it comes to the effectiveness of biological evidence in a rape trial. The survivor may wait to report the rape because they fear being shunned by society; as a result, essential biological material is lost. Medical professionals may also approach their examination of the survivor with skepticism as a result of these patriarchal values, which leads to a degradation of the quality of evidence. The court focuses on the credibility of the survivor instead of the use of forensic evidence as a basis to prove or disprove the charge against the accused; therefore, the trial is exposed to bias based on subjective factors. To address some of the socio-legal barriers faced by survivors, the Supreme Court of India issued a ruling in the case of *State of Punjab v. Gurmit Singh*¹⁸, which focused

¹⁸ *State of Punjab v. Gurmit Singh*, (1996) 2 SCC 384 (India)

on the dignity of the survivor; however, the actualisation of this decision at the grassroots level has been inconsistent.

In addition, marginalized communities encounter compounded difficulties in procuring forensic justice due to socioeconomic factors, which restrict their capacity to manage complex procedural requirements. Additionally, multiple forms of marginalization based upon caste, gender, or poverty create multiple forms of evidentiary failure, making biological evidence ineffective in attaining justice. Therefore, these socio-legal barriers show that reforming forensic systems must occur concurrently with changing the culture within investigative and judicial institutions.

Proposed reforms for the Implementation of Evidence Integrity and Justice in the Forensic System:

This will require a comprehensive approach that includes legislative, institutional and technological reforms to resolve the evidentiary and biological gaps identified through current evidence-based practices in India. To do so will require:

1. The adoption of a national standardized method of handling biological evidence and crime scene processing through criminal investigations in an enforceable fashion.
2. The expansion and adequate funding of the forensic laboratory system to reduce backlogs in testing and timely distribution of forensic reports.
3. Mandatory training programs for forensic officers and police officers to improve both police officers and all officials within the justice system on the principles of forensic science.

Create a comprehensive framework for DNA governance by developing laws that balance the need for privacy with the need for effective investigations. Strengthening the witness protection program will help maintain the integrity of corroborative testimony and improve the reliability of evidence through the integration of digital forensics, body-worn cameras and electronic evidence management systems will increase the reliability of evidence. The intent of these reforms is to transition the criminal justice system from an adversarial method of operation, to a proactive method of operation, thus minimizing opportunities for evidentiary failure.

CONCLUSION

The acquittal of actual perpetrators in murder and rape cases in India is not just the result of legal loopholes but a symptom of a deeper-rooted biological and evidentiary failure. The failure to preserve, analyze, and present forensic evidence not only undermines the truth-finding mission of criminal trials but also continues to cause systemic injustice. This study proves that evidentiary loopholes, in addition

to investigative and judicial lapses, and socio-cultural impediments, have resulted in an environment where reasonable doubt triumphs over actual guilt. Until India makes serious forensic and evidentiary reforms, the criminal justice system will continue to let down victims and society at large by allowing perpetrators to go scot-free.