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Forensic Justice in Pakistan: The Evidentiary Value, Judicial Interpretation, and Institutional Challenges of DNA Profiling in Sexual Offence Trials

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ABSTRACT

This study critically examines the jurisprudential and systemic barriers preventing DNA profiling from operating as conclusive evidence in Pakistan's sexual offence trials, analyzing the profound tension between scientific certainty and orthodox legal frameworks. This study employs a rigorous doctrinal and socio-legal approach to evaluate statutory provisions, namely Articles 59 and 164 of the Qanun-e-Shahadat Order, 1984, alongside recent appellate jurisprudence, including Atif Zareef v. The State and Muhammad Hassan v. The State, supplemented by institutional gap analyses. This study reveals a paralyzing forensic paradox within the criminal justice system. While the Anti-Rape (Investigation and Trial) Act, 2021 progressively outlaws' archaic practices, such as the two-finger test, appellate courts rigidly relegate DNA to a mere corroborative status. This judicial conservatism is severely compounded by deep institutional bottlenecks, particularly chronic chain-of-custody violations by untrained law enforcement and acute infrastructural disparities outside the Punjab Forensic Science Agency. Consequently, when substantive ocular testimony fails, the entire prosecutorial case invariably collapses, despite mathematical biological certainty. To transition from a highly witness-dependent paradigm to genuine forensic justice, the legislature must urgently amend evidentiary laws to elevate uncompromised DNA matches to substantive proof. Furthermore, mandatory ISO certification for all provincial laboratories and the establishment of a centralized national database are strictly imperative to cure the systemic failures frustrating rape prosecutions.

Keywords: *Forensic Justice; Evidentiary Value; Sexual Offence Trials; Chain of Custody; Anti-Rape Act 2021*

INTRODUCTION

Epistemological principles of criminal law have radically changed in the past century, in which absolute dependence on human memory has been replaced by the objective assurance of forensic science. Criminal jurisprudence has been significantly changed by the influence of DNA profiling, which has been adopted in most countries worldwide. It has substituted the biological identity of biological testimony with the inherent unreliability of ocular testimony. In jurisdictions that have sophisticated forensic systems, a DNA match is frequently the uncontroversial basis for a criminal conviction. However, with the Pakistani system of criminal justice, the incorporation of this new scientific evidence poses a fundamental challenge to the dogma. This strain is evidently severe in the prosecution of sexual offences. In the past decades, trial courts have relied virtually solely on the accounts of witnesses and highly intrusive, non-scientific medical examinations to determine the fact of rape and sodomy.

Although the Supreme Court of Pakistan has been vocal in overturning archaic traditions, such as the explicit prohibition of the infamous two-finger virginity test in Atif Zareef v. The resulting evidentiary vacuum, according to the State (2021), has not been filled in smoothly by forensic technology. Rather, the criminal justice system is still struggling to find a way to accommodate DNA evidence without completely reworking the old, witness-intensive principles of the Qanun-e-Shahadat Order, 1984 (QSO).

The central tension lies in the judicial categorization of DNA profiling. The current system of laws provides a conflicting platform for scientific evidence. Article 164 of the QSO specifically states that modern devices and techniques can be used to produce evidence that can be considered in courts. However, DNA test results have always been consigned to the position of corroborative, but not primary, evidence by the appellate courts. They do so by classifying forensic reports as the opinions of experts covered by Article 59 of the QSO (Cheema, 2024). This categorization has harsh legal connotations. Science is reduced to legal subservience before humanity. Once the primary ocular evidence is considered weak, or when a traumatized victim becomes aggressive under the weight of high societal pressure, corroborative DNA evidence typically fails, notwithstanding its statistical impeccability. This judicial conservatism has been brought home in recent decisions in a very graphic manner. In Salamat Mansha Masih v. Muhammad Hassan v. the State (2022). In its decision, the Supreme Court (2024) reintroduced the rigid legal framework, according to which DNA cannot exist independently and suffice to prove a conviction in the absence of a supporting narrative. Although the Court has, in some instances, compared the irrelevance of DNA with that of fingerprinting (Ali Haider v. Jameel Hussain, 2021) is an exactly accurate scientific instrument that is regularly reduced to an auxiliary function within sexual offence cases.

Judges who show interest in forensic evidence often admit that DNA reports are inadmissible because of institutional failures. The process of transporting biological evidence from the crime scene to the courtroom is fraught with procedural weaknesses. This is a delicate chain. Officers involved in investigations are not necessarily well-trained to collect, package, and transport sensitive biological evidence in the most suitable manner. The resulting consequence of this inability is a routine breach of the chain of custody. According to Pakistani criminal jurisprudence, if this chain is broken or weakened to some extent, the value of the forensic report as evidence disappears. The courts have a legal obligation to provide the accused with the benefit of the doubt. Mujahid Khan, 2016). Moreover, the distribution of forensic infrastructure throughout the country is acutely inadequate. The Punjab Forensic Science Agency (PFSA) works to high international standards. Other provinces, on the other hand, are short of certified laboratories, appropriately equipped crime scene teams, and trained female medico-legal officers (Lari et al., 2024). This dictates that the admissibility and quality of DNA evidence is largely determined by where the crime was committed or by the objective facts of the case. Although the Supreme Court ordered the use of DNA testing in all rape cases more than a decade ago (Salman Akram Raja v. Administrative compliance is random, Government of Punjab, 2013).

The legislature has identified these systemic shortcomings and has attempted to close the forensic gap by enacting specific legislation aimed at closing this gap. The adoption of the Anti-Rape (Investigation and Trial) Act (2021) is, on paper, a major paradigm shift. The Act requires the establishment of anti-rape crisis cells and special sexual offences investigation units (SSOIUs). It requires medico-legal examinations that are fast. It outright bans intrusion virginity tests. However, the legislative purpose of the 2021 Act often conflicts with the ground realities that are here to stay. The legal necessity to complete trials within a rigid four-month period is continually thwarted by huge forensic queues and slow reports by chemical examiners (Sarfraz, 2024). The machinery of procedure established by the Act has not been completely adjusted to the mechanism of investigation already established by the Code of Criminal Procedure, 1898.

Laws, courts, and institutions overlap to create the main issue discussed in this paper. The main research question is: To what extent do legal ambiguity, judicial interpretation, and institutional deficiency

prevent the successful use of DNA profiling as conclusive evidence in the prosecution of rape and sodomy cases in Pakistan, and what reforms are required to fortify the forensic justice system? In order to address this question systematically, the paper is organized based on three sub-questions that support it. The first evaluates the current judicial interpretation of the evidentiary weight of DNA profiling within the context of the QSO, with a critical look at the primary versus corroborative evidence debate. Second, it examines the bottlenecks in the process, including chain-of-custody weakness and inadequate forensic infrastructure beyond Punjab, which constantly undermine evidence admissibility. Third, it considers the potential reformative effect of the Anti-Rape Act of 2021 and asks whether new legislation is sufficient to overcome these issues or simply superimposes new processes on a malfunctioning system. This study, by peeling back the layers of these intersecting problems, suggests practical legal and institutional realignments needed to transform DNA evidence into a secondary support structure and make it the primary foundation of conclusive evidence.

LITERATURE REVIEW: THE FORENSIC-LEGAL PARADOX

Global vs. Local Perspectives: The Systemic Disparity in Forensic Application

The introduction of deoxyribonucleic acid (DNA) profiling technology into the criminal investigation process represents perhaps the most drastic jurisprudential change since the inception of fingerprinting. The mature legal systems all over the world have left the debate as to whether forensic science should be admissible, and are now concerned with the optimal utilization of its investigational capability by providing centralized databases which are statutorily safeguarded. CODIS is a highly coordinated national system in the United States, in which DNA profiles are shared and compared electronically by federal, state, and local labs. With consistent regularity, this system propels DNA to a new status as a supplementary instrument to the main tool in identifying recidivist offenders and solving cold cases (Miller & Kasper, 2025). Similarly, the National DNA Database (NDNAD) of the United Kingdom has irrevocably changed the evidentiary environment by bringing an appearance of scientific accuracy that dominates prosecutor tactics and plea bargaining. The use of forensic science in a jurisdiction is an initiative-taking investigative engine. The advent of investigative genetic genealogy (IGG) and rapid DNA technologies is another example of a comfortable legal force that is content with using biological certainty to meet the burden of proving beyond a reasonable doubt (Rasheed & Fatima, 2024).

In contrast, a scholarly review of the literature on the forensic course of Pakistan indicates a highly disaggregated reactive structure characterized by infrastructural imbalance. Although the creation of the Punjab Forensic Science Agency (PFSA) in accordance with the Punjab Forensic Science Agency Act, 2007, not only brought world-class, ISO 17025-approved facilities to the area but also caused a severe geographic imbalance in access to justice. Legal scholars often point to the use of the dichotomy of Punjab and the rest of Pakistan. The forensic infrastructure in other Indian states is largely underdeveloped, and they continue to use outdated chemical examiner labs that often cannot comply with the standard chain-of-custody requirements required by appellate courts (Baig & Hameed, 2025). This local truth was clearly illustrated through a gap analysis conducted in the Islamabad Capital Territory (ICT), where investigating officers continuously mishandle biological evidence because of an underlying lack of understanding of the vulnerability of forensic materials (Lari et al., 2024). Consequently, the Pakistani criminal justice system does not have a national DNA database equivalent of CODIS. In the absence of cross-provincial data and standardized data collection strategies, the forensic possibility of tracking serial offenders through jurisdictions is completely neutralized, and trial courts are solely at the mercy of the more fluctuating capabilities of local police agencies.

The Doctrinal Shift: From Hudood to Survival-Centric Legislation

The explanation of the existing judicial reluctance to use DNA evidence can be traced back to the development of sexual offence legalization in Pakistan. For decades, rape prosecution has been based on the highly contentious Offence of Zina (Enforcement of Hudood) Ordinance, 1979. This system

blurred the line between rape (Zina-bil-Jabr) and consensual extramarital intercourse (Zina), placing an almost insurmountable evidentiary burden on victims in such cases. According to Tazkiyah-al-Shuhood, a strict-liability system, four adult, pious male witnesses were needed to testify, ocular, to obtain a maximum penalty, which was fundamentally unrelated to the secretive reality of sexual violence (Sarfraz, 2021). In this dogma, scientific evidence had no legal significance in the main case, reducing objective biology to subjective morality.

The legislation repealing this regime began with the Protection of Women (Criminal Laws Amendment) Act, 2006, which decoupled rape and the Hudood Ordinance and restored them to the Pakistan Penal Code (PPC). Nevertheless, the forensic swing occurred with the Criminal Law (Amendment) (Offences Relating to Rape) Act, 2016. This marked the first time that parliament had officially recognized the need for modern science, and the Code of Criminal Procedure (Cr.P.C.) was amended to provide new Section 164-B, mandating the collection of DNA samples from rape victims and suspected individuals. This legal acceptance came after a large amount of judicial coercion; the Supreme Court in Salman Akram Raja v. Investigative failures were already noticed by the government of Punjab (2013) using its own motion, instructing the state to make DNA testing mandatory in all rape cases.

Even with these developments, the criminal justice system continues to use misogynistic methods of investigation, and the most notable of them is the two-finger virginity test. The turning point seems to have been reached critically in 2021, when the Supreme Court in Atif Zareef v. This obtrusive medical procedure was ruled unconstitutional by the State (2021). The Court ruled in Article 14 of the Constitution that the practice was unscientific and unconstitutional and an insult to human dignity. This judicial criticism led to the formulation of the Anti-Rape (Investigation and Trial) Act, 2021. The 2021 Act is a unique step towards jurisprudence that is more survival-centric. It strictly prohibits the two-finger test (Section 13), instigates Anti-Rape Crisis Cells (ARCCs) that provide immediate medico-legal assistance, and demands the establishment of Special Sexual Offences Investigation Units (SSOIUs). However, modern legal commentators claim that the Act is theologically forward-looking, but its implementation is still frozen. According to the scholars, the legislative goal to end the trials in four months consistently collides with the fact of persistent forensic backlogs and systemic administrative lethargy (Sarfraz, 2024).

Identifying the Gap: The "Corroborative" Status vs. "Conclusive" Science

The most dominant paradox of Pakistani legal scholarship on forensics is a profound contradiction between the scientific infallibility of DNA and its peripheral legal position. DNA profiling is known in the laboratory as a definitive identifier and is usually expected to be a statistical probability of guilt greater than 99.9%. Structurally, it is downgraded in the courtroom. The Qanun-e-Shahadat Order, 1984 (QSO), in Article 164, has left the issue of admissibility of evidence produced by modern devices to the discretion of the courts. Simultaneously, Article 59 considers forensic reports to be expert opinions. This categorization is deadly to the autonomous power of DNA evidence. Pakistani jurisprudence always believes that the opinion of experts cannot be the sole ground for a conviction; it must be corroborated.

This judicial conservatism poses an evidentiary stalemate in the trials of sexual offences. There is a witness-heavy model of trial courts. If the main eyewitness testimony, typically that of the victim, is impaired, withdrawn because of social pressure, or found to be contradictory, so does the DNA evidence. This boundary was strictly applied by the Supreme Court in Salamat Mansha Masih v. In Muhammad Hassan v. (2022), and later by the State (2022). The State (2024) stated that forensic reports are corroboratory. If the underlying story of the prosecution does not work, anything scientific, no matter how accurate, cannot provide a conviction mathematically. An LHC judgment of 2025 (2225 LHC 2225) was the ideal conclusion of this hard-and-fast approach, in which the conviction was overturned, even when the PFSA report indicated that the accused was at the crime scene. The Court observed that permitting a machine to avoid the need for human substantive evidence would upset the

vulnerable equilibrium of the value-based criminal justice system.

According to the academic literature, there are two main causes of judicial reluctance. The first is the structural framing of the QSO, which Cheema (2024) claims must be changed immediately through a legislative act to make DNA the primary evidence. Second and even more crippling is the mistrust of the law courts in the police administrative. Judges are extremely sensitive to the incompetencies and corruption that abound in the local police force. In Azeem Khan v. The Supreme Court, the author specifically mentioned world scandals of contamination of laboratories, indicating that since the extraction and transfer of DNA are under the jurisdiction of human agencies, the manipulation possibilities are enormous (Mujahid Khan 2016). Whenever defense counsel proves a broken chain of custody, such as an inability to explain the time lag in transferring swabs to the laboratory or the transfer of the malkhana register, courts must dismiss the entire forensic report (Awais v.). The State, 2025).

Finally, there is a system that gets stuck in the vicious cycle identified in the literature. Progressive laws established by the legislature mandate forensic integration (Anti-Rape Act, 2021), there is a lack of funding to build the provincial infrastructure to gather evidence in a clean manner. Consequently, the police provide contaminated or defective samples. The judicial system, aware of such flaws in the investigation, and subject to the chronically outdated restrictions of the QSO, justly regards science with distrust, reducing it to corroboration. The scholarly disjunction is not in demonstrating the scientific validity of DNA; rather, it is in the creation of a procedural and statutory system that would be sufficiently strong to enable Pakistani courts to place their faith in the science that assigns conclusive evidence of guilt.

Legal Framework & Evidentiary Weight

The law of evidence in Pakistan is still clumsily held on the epistemological reality of the past, and it presents a sharp clashing point when it has to give way to the scientific certainties of the present. Unraveling the bizarre course of DNA profiling in sexual offence trials, one must, first of all, rip the text of admissibility and probative value: the Qanun-e-Shahadat Order, 1984 (QSO). It is on these narrow parameters that the war between objective scientific evidence and subjective eyewitnesses is a daily fighting battle.

Qanun-e-Shahadat Order (QSO), 1984: The Statutory Constraints of Articles 164 and 59

The Qanun-e-Shahadat Order was issued to make the Evidence Act of 1872, enacted during the colonial era, conform to Islamic injunctions. However, it largely maintained the orthodox British common law tradition in the treatment of scientific evidence. The future of DNA evidence in Pakistani courtrooms is predetermined by two particular provisions: Article 164 and Article 59.

Article 164 was an advanced addition to the time and provided that, where the court finds it fit, it may allow the production of any evidence that has become available because of modern devices or methods (Qanun-e-Shahadat Order, 1984, Art. 164). Facially, this provision acts as a gateway for sophisticated forensics based on statute. However, a close examination shows that it is fatally flawed. The legislature used may" and not the imperative shall. This linguistic option assigns the trial judge absolute discretion. The admissibility of DNA profiling is therefore not given a presumption of rightness but is wholly at the mercy of judicial discretion. Although the Supreme Court made a groundbreaking order in Salman Akram Raja v. The collection of DNA in the cases of rape is a requisite of the Government of Punjab (2013), the factual admission and weight of such evidence at trial are still attached to the cautious formula of the QSO.

Having passed through the gateway of Article 164, the DNA report is immediately hit with the harsh degradation of Article 59. In Pakistani evidence law, a forensic scientist is an expert, and the report of such an expert is called an expert opinion. Article 59 states that in cases where the court has to give an

opinion on a matter of science, it should consider the opinions of individuals who are specifically educated in the science as relevant facts. An opinion, jurisprudentially speaking, is not a fact in issue. The Pakistani criminal justice system has the underlying belief that expert opinion is typically a feeble, self-consuming kind of evidence on which to rely to form a single conviction (Rasheed and Fatima, 2024). The law assumes that any experts, regardless of their scientific rigor of their methodology, are only helping the court to interpret the facts, and not to determine the factual part of the case itself. The QSO effectively barricades the working of DNA profiling as an independent substantive pillar of proof and relegates it to a subservient classifying role.

Primary vs. Corroborative Evidence: The Judicial Reluctance

This statutory category gives rise to the most disabling argument of contemporary Pakistani crime legislation: the treatment of DNA as supporting and not main evidence. Substantive (or primary) evidence refers to evidence that can be used to ascertain a fact in issue. Corroborative evidence can only justify or prove substantive evidence. In sophisticated courts, a perfect match of DNA between a suspected person and a rape victim is often considered a piece of evidence that can substantially prove identification and contact. However, in Pakistan, appellate courts have been unwilling to strengthen DNA evidence beyond corroboration.

This conservative judicialism was ruthlessly restored in the new Supreme Court decision in Muhammad Hassan v. The State (2024). In this ruling, the highest court set a definite limit, as it did not remove the fact that DNA analysis is most accurate and has colossal probative value; it is a legally corroborative piece of evidence. The Court explained this fact in its statement, explaining that forensic evidence cannot exist on its own; it must have a background narrative, which is often the eyewitness testimony of the victim or other witnesses. Once the primary ocular witness has been discovered to be untrustworthy, contradicting, or corrupt with hostility, the secondary DNA evidence, though statistically impeccable, goes down with him.

This is a disturbing rule in sexual crimes, where the victim usually recalls preliminary evidence to render it inadmissible due to overwhelming social pressure, out-of-court settlement, or trauma. A bright example of a system failure can be found in a petition to revise that is currently being presented to the Lahore High Court (Revision Petition No. 192 of 2024, 2025 LHC 2225). In this case, the Punjab Forensic Science Agency (PFSA) developed a good match of the DNA profile of the victim and the accused. However, the victim got upset at the time of trial and was not willing to testify against the accused. The prosecution was trying to get a conviction using the PFSA report as the sole, undisputed evidence. This was not an effective tactic, and the High Court declared that DNA is corroboratory only. The case of Salamat Mansha Manshi v. in the Supreme Court precedent. The High Court decided that a biological match with defeated substantive human testimony is an unsafe basis on which to enter a conviction (The State 2022).

What is there in the judicial system that causes profound distrust of mathematically correct science? The rejection of the science is not the answer, but rather a historical-enhanced suspicion of the human agencies tasked with administering it. When referring to supportive jurisprudence in the Lahore High Court, it was noted that the entire process of acquiring DNA evidence is controlled by fallible human entities, that is, the local investigating officers. Owing to the reality that the police machineries in Pakistan are regularly tainted with allegations of corruption, incompetencies, and factual fabrication of proofs, the courts are convinced that there is adequate time to contaminate or expose the samples to any alterations prior to reaching the uncontaminated air of the PFSA (Baig & Hameed, 2025). The logic behind the judiciary ruling is this: allowing a machine to completely escape the necessity to utilize human, cross-examined testimony would disrupt the fragile value system of the criminal justice system, which can, in effect, result in innocent citizens being wrongly forensic charged.

Identity vs. Consent: The Muhammad Imran Precedent

To comprehend the clear implications of the evidentiary usefulness of DNA in a sexual offence case, there is a need to bifurcate the substantive crime of rape in Section 375 of the Pakistan Penal Code. Two aspects in the prosecution part meet the criteria of the crime: the first is actus reus (the physically occurring penetration of the sexual organs), and the second is that the victim never gave her legal consent.

Defense counsels have exploited the consent aspect in the past. If a victim survived an assault and neither suffered any violent physical injury nor any noticeable bodily harm, the defense would argue that not resisting violently meant consent. Atif Zareef v., gave this misogynistic legal fiction a serious decline at the hands of the Supreme Court. The State (2021), which has made the degrading two-finger virginity test a crime, stated that the physical resistance of a victim was not a necessary requirement to prove rape. DNA profiling has been highly valued since the abolishment of archaic medical tests.

The first is occurrence, which is dictated by DNA. When an accuser asserts that he has never seen a victim, a positive result at the DNA level is an ultimate rejection of a mistaken identity defense or an alibi. However, DNA cannot look into the minds of the parties; it will not be able to prove scientifically whether the transfer of biology was voluntary or involuntary.

This was a subtle court verdict handled with care under the special ruling in the case of Muhammad Imran v. by Justice Ayesha A. Malik. The State (2024). The defense in Muhammad Imran did not refute the matching of DNA evidence but turned to the fact that the sexual contact was consensual, basing much on the delayed reporting by the victim and the absence of physical struggle. The Supreme Court soundly dissented from this story. The Court determined that when DNA evidence beyond any reasonable doubt proves that the sexual act did occur, the evidentiary stage is significantly changed. When biological evidence of perpetration is combined with the victim ’s confident statement, it makes an excellent case for a prosecutor. The Court stated that the defense cannot easily conceal behind this veil of the so-called implied consent when the victim was too frightened or traumatized to say no.

Imran (2024) describes the judicial system as a complex evolution. Although the Court did not exceed the limits of the QSO of considering DNA as corroboration of the primary testimony of the victim, it gave it the maximum probative value. This was an indication to trial courts that, even though DNA cannot mathematically determine or calculate consent, its absolute certainty of identity and occurrence significantly impairs the burden of evidence required of the traumatized survivor. With the scientific fact of biological transfer coupled with a contemporary, trauma-informed interpretation of consent, the Supreme Court has started creating an opening in which forensic evidence will be given the reverence that it deserves, and DNA will gradually become the heart of the sexual offence case rather than being positioned merely on the periphery as a scientific novice.

Judicial Interpretation & Landmark Precedents

The process of turning a statutory text into courtroom reality is solely reliant on the philosophy of interpretation of the appellate judiciary. The appellate courts in Pakistan work as the inquisitors of the scientific integration and protectors of the old due process in the contextual terms of forensic evidence. The Supreme Court of Pakistan and the provincial High Courts have produced a thick mass of jurisprudence in the last 10 years concerning the probative value of Deoxyribonucleic Acid (DNA). This legal path is a great institutional battle. The courts are trying to gradually destroy the archaic, misogynistic approaches to assessing sexual offences on the one hand, and on the other hand, to oppose the wholesale delegation of judicial fact-finding to lab equipment.

The "Gold Standard" Rhetoric: Dismantling the Two-Finger Test

In order to value the present judicial attitude to DNA, it is necessary to consider first the evidentiary dark age to which it is replacing itself. Traditionally, the way rape was adjudicated in Pakistan was strongly associated with the moral remaining purity of the victim. Without the current state of forensics, trial courts commonly depended on the extremely invasive and medically invalid "two-finger test" (TFT) to determine whether a woman was habituated to sexual intercourse or not. Judgments of the early 2010s are full of cases in which the victims were called women of dubious character or not of fair virtue just because their hymens were not intact or their vaginas were considered patulous by a Medico-Legal Officer (Ghulam Mohay-ud-Din alias Baoo v.). The State, 2012; Muhammad Yousaf v. The State, 2015). This medico-legal procedure was useful in changing the accused trial into the sexual history of the victim inquiry.

This doctrinal discontinuity came with the watershed decision of the Supreme Court in the case of Atif Zareef v. The State (2021). The two-finger test was categorically prohibited by the apex court, which found the test to be offensive to the constitution, lacking scientific foundation, and in outright violation of the right of the victim to dignity as stipulated in Article 14 of the Constitution of Pakistan. The Court clearly stated that rape is a violent crime, not a problem related to medicine and depends on whether one was a virgin or not. The Supreme Court created a huge evidentiary vacuum by depriving the defense of the chance to clothe its defense in the archaic fiction of the implied consent that arises from the physical acceptance of a victim.

It was to fill this gap that DNA profiling was immediately raised. In later decisions, the Supreme Court started employing what can be called the gold standard rhetoric by legal scholars. According to the Court, DNA offers a mathematically accurate process of identifying offenders and ruling out the innocent, and this constitutes an objective reality that is independent of the moral status of the victim. This legal activism sparked legislative responses and eventually led to the statutory permanence of the doctrine of Atif Zareef by Section 13 of the Anti-Rape (Investigation and Trial) Act (2021), which specifically banned virginity testing and required a forensic foundation. However, naming DNA a gold standard in dicta did not immediately solve the structural complications of admitting DNA as substantive evidence at trial.

Inconsistencies in High Court Rulings: The Hostile Witness Dilemma

The most evident outburst of the constraints of this standard of gold occurs when the human factor of the trial breaks down. A hostile witness is a disease in the Pakistani socio-legal environment. The victims of sexual violence are habitually subjected to enormous extra-legal strains, which may comprise direct physical intimidation to out-of-court intimidation-based money agreements (informal panchayat settlements), where they are compelled to withdraw their initial evidence in court. The prosecution is then left with an impeccable DNA report, but lacks an ocular account when the victim resiles.

The High Courts are still heavily divided over the manner in which to manage such particular situations, torn between the strictness of applying the old rules of evidence and the need to deliver punishment to scientifically proven culpability. The Lahore High Court (LHC) has embraced an infamously rigid compliance with the corroborative rule. In a consequential revision of 2025 (State v. In the case, accused, 2025), the LHC faced an issue in which the Punjab Forensic Science Agency (PFSA) conclusively identified the DNA of the accused with the seminal fluid found on the victim. The victim, on the other hand, totally refuted the rape when she was cross-examined. The prosecutor asked the court not to consider the recantation and convict based on the absolute biological certainty of the PFSA report only. The LHC categorically declined. The appeal of the lower courts based on the precedent of Salamat Mansha Manshi v. The LHC decided that forensic evidence is categorically corroboratory (The State, 2022). As soon as the substantive evidence (the testimony of the victim) is lost, the corroboratory evidence, however scientifically impossible to disprove, cannot be uplifted to furnish the conviction. The LHC decided that permitting a machine to remove human testimony would ruin the fragile equilibrium in the value-based criminal justice system, which would allow corrupt investigating officers

to frame people using planted DNA. Accused, 2025).

In contrast, the Sindh High Court (SHC) has, at times, displayed a different kind of juristic temperament in dealing with retracted testimonies and circumstantial chains. Although the SHC is not exempted by the same Supreme Court precedents as to whether expert opinions are corroborated, its benches have occasionally engaged in a level of heavy scrutiny on the cause of the hostility of the victim, trying to salvage the forensic reality. In cases like Nazim v. Some of the issues that SHC, the State (2021) needed to struggle with are that fact that the dumping of DNA due to a traumatized victim becoming mute is a welcome bonus to intimidate the witnesses. Nevertheless, even regarding these judicial concerns, the overall national precedent established in Muhammad Hassan v. The State (2024) puts the High Courts into a box: when the primary ocular account fails, the DNA fails. This extreme interpretation stance presents a bothersome forensic paradox. The scientific establishment of a man as having left seminal fluid on a child and acquitted in court may occur due to the trial court refusing to recognize the DNA report as a substantive fact on its own.

Constitutional Safeguards: The Interplay of Articles 13 and 14

The mandatory displacement of biological material of an unwilling suspect or a traumatized victim obviously causes a deep constitutional analysis. Appellate courts have been pushed to carefully trace the borders of forensic investigation against the basic rights of the Constitution, namely, Article 13 (protection against self-incrimination) and Article 14 (inviolability of the dignity of man).

Defense counsel often use article 13 to suppress the admission of DNA evidence. Article 13(b) ensures that no convicted individual should be compelled to testify against themselves. The constitutional issue brought before the judicial system was whether being coerced to give a buccal swab or a blood sample constitutes testimonial compulsion against an accused person. This was settled in the landmark case Salman Akram Raja v. by the Supreme Court in suo-motu proceedings. Government of Punjab (2013). The Court made a sharp jurisprudential distinction between testimonial and physical evidence. Based on comparative constitutional law, the Court found that the state cannot coerce the accused into giving a confession of what is in their mind but has a legitimate and overriding interest in searching the physical body of the accused to obtain objective indications of a crime. Therefore, the right to self-incrimination privilege is not violated by extracting DNA. This legal argument resulted in a reasonable interpretation of Section 53A of the Code of Criminal Procedure, 1898, a statutory act that provides the option of a forced medical examination and DNA sampling of an individual suspected to have committed rape.

But when once the victim happens to be the one under extraction, the constitutional calculus is thrown upside down. Article 14 guarantees the dignity of every citizen, and the courts realize that the survival of sexual assault victims wipes away the physical and psychological independence of the victim. Any compelled use of a victim to undergo a medical checkup or provide DNA swabs is a solid argument for re-victimization by the state. The Supreme Court in Salman Akram Raja (2013) made it very clear that the informed consent of the victim is an absolute constitutional condition for any forensic collection. Moreover, the Lahore High Court strengthened this in Sadaf Aziz v. The entire medico-legal process should be designed in a way that does not jeopardize the dignity of the survivor, and archaic questions about the history of sexual activity should be avoided (Federation of Pakistan, 2021).

This gives rise to an interesting, yet necessary, constitutional dichotomy in the Pakistani forensic environment. The body of the defendant is treated juridically as an evidential depository to which a human being has to be compelled, whereas the body of the victim is treated as an inviolable sanctuary, the need to consent safeguards. Although this upholds the dignity of the victim, it sometimes poses a challenge to investigators; when a seriously traumatized victim or someone who has been socially pressured declines to provide permission to have their DNA swabbed under Section 164-B of the Cr. P. C., the state is rendered completely helpless to offer the jury the so-called gold standard of evidence to obtain a secure conviction.

Institutional Challenges & Procedural Bottlenecks

Progressive jurisprudence must be translated into the machinery of the state to achieve the realization of justice. As the appellate courts grapple with the jurisprudential nature of forensic science and the legislature writes ambitious laws, the real outcome of a sexual offence case in Pakistan is normally determined far before a judge is assigned the case. It is determined in the sterile, frequently leaking ambiance of the rural hospital, the anarchic cramped space of the malkhana (evidence storeroom) of the local police station, and amidst the transit of delicate biological material over long provincial highways. The Pakistani justice system is plagued by poor institutional connectivity. We have scientific capacity in the 21st century; however, we continually subject it to a 19th-century machine of investigation. This section critically appraises the deep-rooted procedural bottlenecks that render the efficacy of DNA profiling futile and make it appear more like a casualty of administrative incompetence on a regular basis.

The Chain of Custody Crisis: From Contamination to Acquittal

The scientific validity of a DNA match in forensic jurisprudence is of no legal relevance when the prosecution is unable to convincingly show how the sample moved out of the body of the victim to the laboratory centrifuge. This continuous written chronological record is referred to as the "chain of custody." In Pakistani law, the chain of custody is not a formality; rather, it is a legal threshold. With the interruption of the chain, the evidence is considered contaminated before the law, and its probative value is considered zero. This rule is enforced with severe regularity by the appellate courts on the basis of the underlying assumption that human agencies, which are narrowed down to the local police force, are prone to corruption, negligence, and the fabrication of evidence (Baig & Hameed, 2025).

This institutional suspicion permeated all levels of institutions, as expressed by the Supreme Court of Pakistan in Azeem Khan v. Mujahid Khan (2016). The Court even stated that because the collection and transportation of DNA are governed by investigating officers, the chances of intentional interference with them to obtain the required reports are overwhelming. The judiciary therefore expects that the procedural safeguards provided in Chapter 25 of the Police Rules, 1934, must be followed to the letter. The judges are obsessive when examining the malkhana register (Register No. XIX) when considering forensic evidence in trials of sexual offences. They seek to know the precise time that the vaginal swabs were received, the name of the Muharrar (head clerk) to whom they were given, the circumstances under which they were kept, and the identity of the constable who took the vaginal swabs to the Forensic Science Laboratory (FSL).

Delays in this transit that are not explained is fatal to the case against the prosecution. A relevant example of such a precedent is the recent jurisprudence of the High Courts regarding safe custody. In Awais v. The Sindh High Court, the accused was granted freedom because the malkhana register entry had been made by an unauthorized individual, and the court cited a three-day delay in sending the evidence to the FSL, which had not been explained (The State, 2025). The court ruled that such lapses in investigation constitute a clear break in the chain of custody, raising the specter of tampering. This is even more disastrous legally in the case of sexual offenses, where biological evidence is most likely to be destroyed by bacterial growth and putrefaction unless refrigerated as quickly as possible.

Infrastructure Disparities: The "Punjab vs. Rest of Pakistan" Gap

A severe geographical difference in forensic infrastructure contributes significantly to the chain-of-custody crisis. Presently, there is no single, well-funded national forensic network in Pakistan. Instead, the justice a victim can have is grossly determined by the province in which the crime occurred.

In Pakistan, the standard of forensic improvement is the Punjab Forensic Science Agency (PFSA), a body that was founded as a result of the Punjab Forensic Science Agency Act, 2007. The PFSA uses

international standards, is accredited to ISO/IEC 17025, has state-of-the-art DNA sequencing technologies, and has dedicated crime scene investigation departments. In Punjab, the geographical distance between crime scenes and a very efficient laboratory is quite bearable, and the organization has strict guidelines concerning the delivery of evidence.

However, the forensic environment outside Punjab is pessimistic. Other provinces, such as Sindh, Khyber Pakhtunkhwa (KPK), and Baluchistan, have been traditionally incapable of establishing and sustaining institutions of similar standards. Although there have been attempts toward the modernization of the Sindh Forensic DNA and Serology Laboratory (SFDL) in Karachi, large parts of Sindh and all of Baluchistan are languishing in the forensic desert (Raza et al., 2023). In such areas, the police have a choice of either using outdated chemical examiner laboratories that, in most cases, do not have the advanced reagents or sterile conditions necessary for modern short tandem repeat (STR) profiling, or crossing provincial boundaries to the PFSA in Lahore.

Such structural inadequacy poses an impossible procedural challenge. It may take days to transport a vulnerable vaginal swab from a remote village in Baluchistan to Lahore. During transit, the sample is subjected to harsh temperatures and various transfers of custody, which significantly increase the chances of degradation and the occurrence of chain-of-custody issues. Moreover, other provinces' dependency on the PFSA is bound to cause significant backlogs. Although the Anti-Rape (Investigation and Trial) Act, 2021, places a statutory requirement that sexual offence cases be disposed of expeditiously, within four months, trial courts in most countries continue to allow cases to be adjourned indefinitely due to the delay caused by a central laboratory overwhelmed by cases and consequently unable to provide the DNA report (Sarfraz, 2024). This gap between Punjab and the rest of Pakistan effectively poses a two-layer system of criminal justice, which is against the constitutional guarantee of equal protection of the law in Article 25 of the Constitution.

The Human Factor: Training Deficiencies of MLOs and IOs

Even if the state goes ahead and constructs a state-of-the-art forensic laboratory in each district, the system will still fail on essential lapses by human actors at the very end of the evidence-gathering chain, namely, the medico-legal officers (MLOs) and the investigating officers (IOs). A detailed analysis of these human failures is empirically presented in the Gap Analysis of Investigation and Prosecution of Rape and Sodomy Cases in Islamabad Capital Territory (ICT), issued by the Legal Aid Society (Lari et al., 2024).

The examination of a rape victim is perhaps the most crucial aspect of a criminal investigation. However, the medical staff to which this responsibility is assigned is in most cases unprepared and, in essence, lacks any forensic training. According to the ICT Gap Analysis, there is a shocking lack of female MLOs, causing traumatized female victims to have to wait long, agonizing hours or under their male doctors, leading to them simply giving up on the legal process. The few examinations that are administered are usually riddled with procedural ignorance. A damning case of an attempted rape, in which penetration was not made (LAS Case #64), is mentioned in the report. Irrespective of this fact, the medical personnel went ahead and sampled anal swabs from the victim and forwarded them to the PFSA to match the DNA. This was a heinous disregard for simple forensic reasoning and subjected the survivor to extreme secondary trauma, while wasting the time and resources of the forensic laboratory (Lari et al., 2024).

Moreover, MLOs consistently apply poor-quality non-sterile cotton swabs and do not adequately allow the samples to dry before sealing them in envelopes, a fundamental mistake that ensures the growth of bacteria and disappearance of the DNA profile before it leaves the hospital. The lack of organized, updated, and modernized rape kits in rural medical institutions is a blatant institutional failure.

Malpractice at the medical front is equaled and, in most cases, surpassed by the failure of the police in

investigation. The ICT gap analysis suggests that there is a paradoxical attitude toward modern investigating officers (IOs): they are over-reliant on forensic science and, at the same time, incapable of ensuring its adequate security. Scared by the convoluted needs of the Anti-Rape Act 2021 and pressured by the media to consider DNA a magic bullet (specifically after high-profile cases such as the Zainab murder case), IOs have started to believe that DNA is the only investigative tool needed. The report observes that the police often neglect old-time, traditional, and fundamental police tasks, such as immediately documenting witness statements, establishing the perimeter of a crime scene, and mapping circumstantial evidence, on the theory that the FSL report will do their job.

However, miraculously, a case file review conducted by the Legal Aid Society presented dozens of examples of cases in which the IO had gathered the DNA sample at the hospital but did not send it to the forensic laboratory; instead, it went to rot in the malkhana. This points to a critical lack of training. Police officers have no background knowledge on why the chain of custody is important; they regard the paperwork as red tape instead of legal blood that runs the prosecution. It is this human aspect that will ensure that until the state solves this issue by introducing mandatory and specialized forensic training for all responding officers and rural medical personnel, the legislative changes proposed by Parliament will only exist as aspirational ink on paper.

Legislative Reform: The Anti-Rape Act 2021

The ultimate failure of the jurisprudential crisis on forensic evidence in Pakistan compelled the legislature to act. The statutory framework of sexual offences over decades has, in a sense, been reactionary; it has paid minimal attention to the question of procedural gears necessary to establish the offence and has almost completely ignored substantive penal punishments. With society outraged by horrific events, such as the murder of Zainab Ansari and the Lahore-Sialkot motorway gang rape, the Parliament passed the Anti-Rape (Investigation and Trial) Act, 2021. This act was hailed as a breakthrough. It vowed to change a criminal justice system that was archaic, with its witness-oriented paradigm, to a new, modern paradigm based on scientific certainty. Nonetheless, an attentive doctrinal and empirical scrutiny of the Act would reveal a deep lack of connection between statutory aspiration and institutional fact.

Appraisal of the 2021 Act: The Promise of ARCCs and Special Courts

Textually speaking, the Anti-Rape Act of 2021 is a very sophisticated document in its writing, and it directly tackles a number of procedural failures that occurred historically. The best innovation in the statute is the requirement of anti-rape crisis cells (ARCCs) under Section 4. As has always been the case historically, the chain of custody involving DNA evidence was habitually broken as victims were compelled to find their way along a slapdash maze of police stations, hospitals, and chemical examiner laboratories. This fragmentation was to be stopped by the ARCC, which would function as a one-stop system. The statutory scheme provides that once a victim is taken to an ARCC, the registration of the first information report (FIR), medico-legal examination, and forensic evidence location are all registered under one roof within a rigid time-span.

By unifying the early investigative reaction, the legislature sought to minimize the mishandling of biological evidence by incompetent local constabularies. Moreover, the Act requires that special sexual offences investigation units (SSOIUs) be established and that special courts, specially designed to adjudicate such cases, be instituted. This indicates the legislature's evident acknowledgment that the investigation and prosecution of sexual violence should entail highly trained, trauma-sensitive officers and litigation judges, instead of police officers and trial judges in general.

Not the least important is the point that in the Act, the decision made by the Supreme Court in the case of Atif Zareef v. will be granted the statutory permanence. (Expressing the invasive two-finger virginity test in the State (2021).) The statute expressly orders that the general moral character of the victim

should not be given any probative value. The 2021 Act legalizes the statutory interment of these misogynistic evidentiary practices, forcing investigating agencies to use current scientific tools as a major principle in establishing the actus reus of the crime through DNA profiling. The architecture of the Act is almost perfect in its effort to promote forensic justice, paper by paper.

Critical Failures: The Friction Between Expeditious Trials and Forensic Backlogs

The Anti-Rape Act, 2021, is a tragedy because the implementation of the initiative has been devastatingly failed. The law attempts to fabricate first-world procedural schedules against a third-world administrative structure. The most glaring expression of this droughting is in Section 16, which requires the Special Courts to either dispose of the scheduled offences expeditiously, and ideally within four months.

This legal plan is viciously incompatible with the stark realities of Pakistani forensic infrastructure. As previously determined, a serious lack of ISO-accredited forensic laboratories is present in the country, except for the Punjab Forensic Sciences Agency (PFSA). Whenever special courts in Sindh, Khyber Pakhtunkhwa, or Baluchistan attempt to comply with the four-month trial requirement, they are instantly depowered by painstakingly slothful forensic scrutiny. Samples that are sent out of the peripherals are often lost during transit or in huge queues at central laboratories. This leaves trial judges in an impossible legal dilemma in that they must either grant perpetual adjournments until the DNA report is received and subsequently destroy a speedy trial under statute or decide to proceed with the trial without the use of forensic evidence, which will automatically lead to the accused being acquitted due to a lack of corroboration.

This is a legislative oversight that is strongly criticized by legal scholars. According to Sarfraz (2024), the fact that Courts of Additional Sessions Judges, who are already overloaded, are merely given the name Special Courts" instead of establishing new full-fledged tribunals has frustrated the Act. The presiding judges in such courts are overwhelmed by their current cases and have no administrative power to make provincial health departments hasten chemical examiner reports.

Even the judiciary has shown considerable dismay regarding this statutory impotency. In an exceptionally enlightening case of Imdad Ullah v. The State (2024), the Court of Lahore High deplored the fact that, even years after the promulgation of this special law, its protective provisions have not yet been implemented in many districts. The ARCCs, which are supposed to be the frontrunners of forensic preservation, are paper-based. They do not have the funding, special rape kits, and trained female medico-legal officers needed to mitigate rape sampling in physically located districts where they have been nominally established (Lari et al., 2024). The Act basically presupposes the presence of an amazingly effective investigative mechanism, which does not actually exist, making the provision of expeditious justice a procedural sham.

The Transgender and Male Victim Exclusion: A Narrow Forensic Gaze

In addition to its administrative flaws, the Anti-Rape Act of 2021 lacks a massive dose of doctrinal myopia on gender. Although the law was written at a time of growing awareness of the many victims of sexual violence, it still adheres strictly to a binary and heteronormative interpretation of assault.

The legal framework dealing with advanced forensic procedures, ARCCs, and protective trial mechanisms is mostly applicable to women and children, but not to adult male victims or transgender victims. Sarfraz (2024) has pointed out the omission of transgender victims as a lethal loophole in the law. They are theoretically legally recognized by the Transgender Persons (Protection of Rights) Act, 2018, but the legal definitions of rape and sodomy (according to the provisions of Sections 375 and 377 of the Pakistan Penal Code) and the procedure of the 2021 Act do not smoothly accommodate the transgender community.

This exclusion has forensic implications that are devastating. Once a transgender person has experienced sexual violence, they are often deprived of the expediency and specialized services of the ARCCs. Local police departments usually decline to enroll their cases under the standard offences of the Anti-Rape Act and instead refer to the general, notorious provisions of the Criminal Procedure Code. The extraction of DNA evidence is never given priority because it is an item that is pushed out of the protective umbrella of the Act of 2021. The medico-legal officers, who have no particular statutory guidelines asking them to give a transgender person a similar urgency of forensic examination as that given to women under the new law, habitually procrastinate examinations, which leads to the irretrievable degradation of seminal fluid or lingo-epithelial cells.

The state has succeeded in institutionalizing an evidentiary protection tiering system by narrowing the scope of who qualifies as specialized in forensic justice, which is legally limited. Scientifically, biological evidence is insensitive to the gender identity of the victim; a DNA swab taken from a transgender survivor has the same mathematical certainty as that taken from a cisgender woman. However, the existing legislative system does not provide for scientific equality. The promise of DNA profiling will continue to be a privilege instead of a universal tool in determining the truth until the Anti-Rape Act is amended to be fully gender-neutral in the rights to forensic and investigative tools.

Proposed Reformative Framework

The above analysis of the doctrine and institutions of criminal justice indicates the existence of a criminal justice system that functions cross-purposely. The legislature passes progressive laws, such as the Anti-Rape (Investigation and Trial) Act, 2021, but the judiciary is still under the orthodox restrictions of the Qanun-e-Shahadat Order, 1984 (QSO). Simultaneously, the apparatus of inquiry constantly sabotages the evidential efficacy of forensic science through its administrative incompetence. This paralysis cannot be overcome by mere efforts. It requires a comprehensive reformative model that is integrated to encompass statutory classification, infrastructural parity, and judicial epistemology.

Legislative Realignment: Elevating DNA to Substantive Evidence

The biggest need in forensic justice in Pakistan is radical statutory realignment of the QSO. The appellate courts are legally bound to accept DNA profiling as mere corroboration, as Article 59 confines it to the type of evidence considered an expert opinion. The Supreme Court has strictly adhered to this rule in Salamat Mansha Manshi v. Mohtar Sawm and Muhammad Hassan (2022). According to the State (2024), the judiciary will not be able to unilaterally promote the status of scientific evidence in the absence of a direct legislative command.

The parliament has to present a clear amendment to the QSO, which may be through adding a new clause into it, such as in Article 164-A, stating that in a sexual offence case, an uncompromised DNA match is substantive evidence of identity and physical contact. This change in jurisprudence already has an embryonic form. In Ali Haider v. Jameel Hussain (2021), the indisputability of DNA was characterized as a comparison of the Supreme Court to fingerprinting, which has enormous standalone probative value. By making DNA primary evidence by law, the legislature would protect the prosecution against the phenomenon of hostile witnesses. The recantation forced out of a victim would not automatically attract an acquittal anymore, even in a case when a biologically conclusive connection puts the alleged offender at the crime scene. Nevertheless, this primary status ought to be categorical to prevent the creation of evidence by corrupt investigating officers. The suggested amendment should provide that DNA assumes substantive weight only when the trial court already feels that the chain of custody has not been broken in any manner, from extraction to the laboratory.

Systemic Integration: Mandatory ISO Certification and a National DNA Database

The elevation that is set by statute is always dangerous in the absence of administrative infallibility. The existing geographical inequality in the forensic infrastructure, Punjab versus the rest of Pakistan, is constitutionally unsustainable. The federal government should require all provincial forensic science labs to be strictly accredited to ISO/IEC 17025 to safeguard the integrity of evidence through evidentiary means. There should be a statutory bar incorporated in the Code of Criminal Procedure, 1898, whereby forensic reports prepared by non-acclaimed facilities are outlawed hierarchically within a specified period. This would compel provincial governments in Sindh, Balochistan, and Khyber Pakhtunkhwa to immediately modernize their chemical examiner laboratories to the level of the Punjab Forensic Science Agency is (Baig and Hameed, 2025).

Moreover, it is a dire need of Pakistan to have a centralized National DNA Database (NDNAD), similar to the CODIS system in the US. Although the Anti-Rape Act of 2021 presumes sex offender registration, it does not have the technicality that would allow the proactive tracking of serial predators in the jurisdictions of different provinces (Sarfraz, 2024). An interoperable, federally-run DNA database would transform forensic science into a reactive weapon, changing each case into an investigative engine. By cross-referencing crime scene swabs with the stored profiles of convicted felons, police would be able to resolve cold cases and identify recidivists without necessarily involving the physical arrest of the suspects, which is slow and usually ineffective (Rasheed and Fatima, 2024).

Judicial Sensitization: Interpreting Probabilistic Forensic Reports

Finally, any structural and statutory reforms will fail if the judicial officers who would assess the science are scientifically illiterate. The present adversarial model promotes judges to sit as passive referees and await the attacks of both the prosecution and defense to quarrel over the content of a forensic report. Such a practice must be substituted with a so-called minimalist inquisitorial approach proposed by Cheema (2024). Trial judges should be prepared to question the scientific basis of the evidence they face.

The Federal Judicial Academy and provincial judicial academies almost entirely revolve around the topic of doctrinal law. They need to establish compulsory, specialized courses on molecular biology and statistical probability for judges who will sit in Special Sexual Offences Courts. Judges should be trained to realize that DNA profiling does not provide certainty but has high statistical chances at the highest probability (e.g., the random match probability). They should be shown how to recognize the so-called prosecutor fallacy, consider the complexities of mixed DNA profiles (when there are multiple contributors that are the rule in gang rape cases), and the particular signs of sample degradation that are pointed out in the ICT gap analysis (Lari et al., 2024).

It is more likely that flawless scientific evidence will be disregarded by trial judges, who, due to their technical competence, will be able to differentiate between a minor procedural anomaly and a lethal contamination incident. Pakistan can only overcome the gap between biological truth and legal justice through the tripartite empowerment of the legislature, systemic standardization, and the scientific literacy of the judiciary.

CONCLUSION

The introduction of deoxyribonucleic acid (DNA) profiling in the Pakistani criminal justice system poses a deep jurisprudential paradox. This study has shown that the main obstacle to attaining convictions in trials of sexual offenses is no longer the inaccuracy of the science, but the weakness of the institutions charged with the responsibility of administering them. Although the Supreme Court of Pakistan made an extraordinary move in the case of Atif Zareef v. By abolishing the constitutionally offensive two-finger test, State (2021) has replaced the resultant evidentiary vacuum with an

extraordinarily vacillating jurisprudence. The statutory requirements of the Qanun-e-Shahadat Order, 1984, continue to hold the appellate courts to ransom. By still delegating to mathematical matches some biological matches as simply a matter of expert opinion that needs to be corroborated by the eye a principle that is strictly reiterated in Muhammad Hassan v. 2024 and Salamat Mansha Manshuri v. The judiciary (2022) the State permits objective scientific truth to be defeated on a routine basis by antagonistic witnesses and socially compromised witnesses.

The unwillingness of the judiciary is not wholly without ground; however, it is a defensive measure against a most malfunctioning investigative machine. The actual forensic justice crisis in Pakistan is in the chain of custody. Mishandling of delicate biological samples by unqualified investigating officers and under-equipped medico-legal officers, or the loss of evidence in transit by the blaring infrastructural imbalance beyond the Punjab Forensic Science Agency destroys the legal integrity of the science. Although the structure of the Anti-Rape (Investigation and Trial) Act, 2021 with Special Courts and Anti-Rape Crisis Cells is commendable, it ultimately fails because statutory ambition cannot cure administrative paralysis. Imposing a severe trial schedule on a system already burdened with forensic cases is only a way to further increase acquittals through the gift of doubt.

Finally, the process of prosecuting rape and sodomy in Pakistan needs to undergo radical epistemological changes. The inherent misconception of modern forensics is that the prevailing paradigm is built upon the notion of DNA as a secondary, auxiliary stimulus of human memory. The legislature needs to positively revise the law of evidence and accept an uncompromised DNA match as material, primary evidence of physical contact and identity to accomplish authentic " forensic justice. Nevertheless, such legal high status should be inseparably connected with unlimited systemic responsibility. It mandates that all provincial labs be accredited under ISO, a national central DNA database should be formed, and trial judges must be specially trained scientifically. They will be able to persist with the perpetrators to continue to take advantage of the procedural loopholes of a system that has been stalled between the 19th and 21st centuries until the Pakistani criminal justice system trusts science sufficiently to turn it into the foundation of the trial, but not a post-hoc add-on to the trial.

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