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Dna Provides Enough Indications And Help Court To Convict An Accused And Release Innocent

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ABSTRACT

In criminal investigations, a theory about how a crime unfolded with circumstantial evidence that identifies the perpetrators of the crime is frequently developed based on a number of competing options. The court can only be convinced beyond a reasonable doubt by strong circumstantial evidence, such as physical evidence, reliable witness testimony, or the accused's own confessions. The manner in which the evidence is gathered, saved, processed, evaluated, and presented is the most crucial factor in determining the caliber of the investigation and the competency of the investigator.

Furthermore, forensic evidence[1] is a scientific field that operates inside Pakistan's legal framework. Its goal is to offer direction to people conducting criminal investigations and to give judges accurate information they can completely rely on such evidence when making decisions during a trial.

In recent years, forensic science has developed into a highly developed scientific discipline that is used in both criminal and civil investigations. It includes all of the currently used scientific methods, including DNA and fingerprint analysis, ballistics, explosives, and even photo granitic testing and lie deduction mechanism.

Keywords: *Pakistan, Forensic Investigation, Admissibility, DNA, Court, Crime Scene, Criminology.*

INTRODUCTION

The application of science to the law or legal concerns is simply one of many factors that highlight the necessity of studying the phenomenon of deviance with regard to forensic science. Science and law often make unusual bedfellows. By creating tests that provide someone with an associate's degree with an unbiased response to the posed topic, scientific knowledge will advance human understanding.

Crime Scene processing is crucial to successful criminal investigations. Forensic science produces genuine crime scene investigations that identify, gather, pack, transport, and analyze evidence. The crime scene had several questionable forensic evidences might become reliable ones if carefully managed and methodically sought for (Arthur Conan Doyle, 2010). Crime Scene Investigation: An Introduction, Jones & Bartlette). A local police officer knows a crime scene is sensitive and works hard to find and gather forensics. Poorly maintained crime scenes may result in false exonerations or convictions due to evidence loss or insufficiency. Police traditionally handled and analyzed crime scenes before obtaining evidence for forensic investigations. Long-held rumors say forensic

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inquiry begins in labs rather than at the murder scene. However, courts have recently adopted a more objective strategy for reaching a judgement by largely relying based on forensic analysis of crime scene evidence. To reduce crime risk and prevent crime, crime scenes' modern policy formulation and conceptual frameworks have been examined.

Documenting evidence and justifying its collection requires skilled and experienced crime scene specialists in intelligence-led policing. Accurate crime scene analysis and manifestation lead to intelligence-led police and forensics intelligence. (Saboor, Abdul, Memon. 2022).

IMPORTANCE OF TODAY'S DNA AND FORENSIC SCIENCE

Before examining the incidental evidence, it can be helpful to highlight the significance of science, modern scientific techniques, and technology advancements in our legal system. This is what the High Court of Pakistan did in its landmark decision, which was published in the Supreme Court Monthly Review No. 2021 PLD 362 Supreme-Court. Courts must comprehend science and its standards, apparatuses, and procedures in order to be accessible to clients in this inventively complex culture. The boundaries of deductively sound information should be respected by the courts in making legitimate decisions. An appointed authority, and particularly a preliminary adjudicator, acts as a guardian of the logical proof and as such should have a superior understanding of science.

Judiciary should always be receptive to developments in legal theory and welcome novel approaches and tools for resolving disputes, provided that the proposed procedure and tool is based on solid research and is widely accepted by established researchers as a reliable and solid strategy or device. As science advances, so will criminological methods, apparatuses, and gadgets.

The Qanun-e-Shahdat Order, 1984's (QSO) Article 164 is the portal that opens to modern forensic science entering our courts. According to Article 164, courts may allow the creation of any evidence that might have become available as a result of modern tools and methods. Article 164's 2017 addition, Proviso 2, provides that a conviction based on contemporary methods and equipment may be upheld when considered in connection with Article 59, Article 164, among other things, enables modern forensic science to be presented in court using respected experts' credible and rational opinions as evidence and to demonstrate reality (Sadaf and Mahmood, 2022).

Forensic science---Importance of forensic science in the criminal justice system stated. Forensic deals with the application of scientific techniques to provide objective, circumstantial evidence. Forensic is a science of interest to the legal system, whose objective is to ascertain what happened in the recent past. Forensic science means nothing more than the science which is used in the courts of law for the purposes of detection and prosecution of crime. This science plays a significant role in the criminal justice system by providing data that can be used to assess the degree of guilt of a suspect. For the purposes of our criminal justice system, investigating agencies have to move towards scientific evidence to establish a crime, and proper care and caution must be taken to preserve and protect the crime scene. The tendency to rely on outdated investigative methods places a big question mark on the effectiveness of the criminal justice system. Crime scenes that are not managed well and do not rely on science will lead to poor-quality evidence and erroneous acquittal. Hence, the police force must make a concerted effort to shift its investigation techniques to include and rely on forensic science and accordingly, train specialized officers in this field. (2024 SCMR 1085). (Pakistan Journal of International Affairs).

FORENSIC SCIENCE MEANS FOR THE JUDICIAL SYSTEM

The Latin term "forenses," which denotes a dispute, is where the word "forensic" gets its root. A conversation from ancient Rome made reference to a public area where formal meetings and discussions took place. In this way, the term "legal science" and its true meaning are defined in reference to the general body of laws. Measurable Science covers the gathering, safeguarding, and examination of evidence sufficient for the formal courtroom arrest of a wrongdoer (Ajmal and Ahmed 2022). So, it is clear that scientific research will be used in the criminal equity framework. The overarching body of legislation typically examines how quantitative evidence is used in the prosecution of criminal defendants. This is because there isn't much room for inclination or treachery when rational methods and tactics are applied. This is the rationale behind the widespread acceptance of DNA profiling and other criminological evidence in courts all over the world. Strangely, the first criminological process to be used dates all the way back to the Chinese (650 A.D.) and includes finger and palm print ID (Ajmal and Ahmed 2022).

HANDLING CRIME SCENES A WIDELY IGNORED AREA

In developing nations like Pakistan, crime scenes are typically ineffectively investigated since scientific research is rarely seen as an integral part of the conversation. The importance of crime scene investigations has not only been downplayed but also overlooked during the past few years. Lack of several crime-fighting innovations already in use in other nations is one reason why crime location management in Pakistan is unsatisfactory. In any instance, police authority to look outside conventional approaches for inspection has been strained by the form and severity of assaults that incite fear, action in legal organizations, widespread media commitment, and growing public awareness. Becoming criminological is necessary, despite the fact that legal institutions are unreliable, if the police are to respond to developments in the sphere of wrongdoing (Richard Reyes 2017); (Ajmal, and Ahmed, 2022). The absence of criminological administrations, along with a lack of preparation and equipment, severely reduces the ability of Pakistani law enforcement to follow through on solving a case. As we presumably already know, many serious wrongdoings require the attention of a well-functioning police administration (Hassan Abbas 2011); (Ajmal and Ahmed, 2022).

THE VALUE OF INVESTIGATING CRIME SCENES

The treatment of crime scenes is arguably the most important aspect of a dynamic and successful criminal investigation. The evidence of who committed the offence is there at the crime scene. The criminal examiner is using techniques like duplicating the murder scene, the suspect's character, and the most important pieces of evidence produced in court (Redsicker, 1991). The actual evidence proves that the offence was committed, connects the offence to the suspect, and identifies the victim of the deception (Swanson, et al., 1998). The use of quantifiable science methods aids in the reduction of misconceptions. The coordination of data indications from witness and casualty interviews with information from the crime scene reduces criminal suspects and successfully aids in identifying the wrongdoing. Examiners are further assisted in identifying real suspects of wrongdoing by techniques like mental profiling, polygraph testing, and handwriting skills. This ensures that fairness will prevail over unfair behavior since the victim will receive justice right away and no one will be unfairly or unjustly treated for a wrong they have not committed (Ajmal and Ahmed, 2022).

Crime scene investigation is a branch of the discipline of criminology that primarily deals with the identification, collection, appropriate grouping, transfer, and evaluation of evidence (Ajmal and Ahmed, 2022). Different speculative confirmations uncovered at the crime scene may become valid measured confirmations if they are carefully considered and handled (Arthur Conan Doyle, 2010). The difference between neighborhood police officers and trained detectives is that the latter option keeping track of the scene of the crime invests significant effort in identifying and gathering evidence from the incident. Crime scenes that

are poorly managed would result in either loss of evidence or poor evidence, which would lead to inaccurate conclusions or feelings in a legal framework (Kirsten Edwards, 2005).

FORENSIC EVIDENCE'S CHALLENGE AND OUR COURTS

The growing body of research and a number of well-known publications that raise fundamental issues with regard to how evidence is collected from crime scenes, how it is collected, and how it is questioned in a lab setting, how evidence is presented in court, how it is ultimately interpreted and assessed in the context of the case, and what role it played in the defendant's conviction or acquittal after the trial can be seen as a turning point in the credibility of forensic science in a criminal justice context. Bringing forensic evidence into courtrooms has been fraught with difficulties, from structural flaws to operational ones. The work of constitutional protections movements, such as the Innocence Project, is based in part on a mistrust of the reliability of the expert testimony presented at trial and the role of forensic evidence, among other things, in improperly jailing innocent people or, conversely, in aiding the prevention of prison sentence for those who commit crimes. Paradoxically, the Innocence Audit is being debated at the same time as "innocent cheating."

Although the underlying issue has arguably become the most demonstrative example of communication failure and may therefore be a clear mechanism by which a paradigm shift might occur. That weaken the relationship between forensics and law should not be limited to an issue of injustices. (Richard, 2017).

The drawbacks of a problematic relationship are perhaps most obvious when fairness is not upheld. Cite procedural mistakes that may result in erroneous convictions: Lack of a unique identifier for evidence or samples examined, non-unique identifiers used in verification processes, failure to provide crucial information to jurors, ineffective communication, and the body responsible for quality assurance of forensic services not having established Suitable quality control techniques to thoroughly examine the given evidence before being included in the trial (Rennison A. 2013). (Rennison A. 2013).

Moreover, it has been proven that safeguards against the alleged "escalation effect" are required. Such a procedural or human error can result in the accumulation of five more errors, which could ultimately result in an erroneous belief (Rennison A. 2013).

Although though they may not complement one another in the same field of endeavor, forensics and the work of legal scholars and practitioners may be influenced by different notions of truth since law represents epistemologies from many disciplinary traditions. It cannot be presumed that these traditions' finishing positions when they collide in a courtroom will be the same unless their starting points are the same. In actuality, these variations can present serious operational difficulties. Although there are numerous variables that contributed to the current status of the science-law relationship, which is complicated, we identify three issues that we think can be resolved if we work towards stronger and more positive ties. This list is by no means complete.

Academics and legal experts have become more skeptical of forensic science, how it is used in cases, and how it affects whether someone is found guilty or not after it has been admitted. Also, professionals from many forensic fields have started reflexive evaluations that contest the shortcomings and veracity of a number of previously acknowledged methods (Rennison A. 2013). Real deference to expert testimony or even the weight of judicial evidence in court is a thing of the earlier. Operational issues with the administration and efficiency of the legal system are among the system's inherent faults (Abregu, 2001), problems with the admissibility of expert testimony (The Law Commission, 2009), problems with reliability testing (Morrison, 2012), and structural problems with juries' influence over expert testimony (Wheate, 2010), the adversarial nature of common law systems (Perlin, et al., 2009), and legal representation bias (Kontorovich) (Gold, 2002; Saks

and Koehler, 2008; Pardo, 2010; Ward, 2004). Because of the benefits gained from forensic science's findings, it is now an essential component of how our judiciary operates.

FORENSIC AS POWERFUL EXPLORING TOOL

Because of the benefits derived from forensic science's findings, scientific evidence is now a cornerstone of how our judicial system functions. (National Research Council, 2011) and its associated uses in prosecuting or clearing criminals. Although forensic science methods are becoming more and more advanced, the concept of using physical or material evidence and how it is used in courtrooms has a much longer history. It appears that there has been a long-standing tension between physical evidence and witness testimony The development of jurisprudence "tells of the continual tension between human testimony and material evidence, and the continuing shift in priority between both at different times," according to Eyal Weizman (Weizman, 2011). In addition, the results to put it another way, the interpreter must interpret and explain the relevance of each potential piece of forensic evidence. Forensic evidence is latent in the interest of justice until an act of preaching occurs.

When we talk about the relationship between science and law, we have to look at the medium used to present evidence to the forum - expert witnesses - as well as how that dialogue is carried out and perceived by the public in court, including both legal professionals and laypeople. As a result, in order to begin a paradigm shift, we must carefully consider the reliability and acceptability of the evidence presented in court, the suitability of the experts, and the accuracy and effectiveness of this proactive interpretation.

LEGAL ENVIRONMENT FOR FORENSIC EVIDENCE

Forensic evidence s this section emphasizes the Qanun-e-Shahadat Order, 1984, which primarily governs evidence laws in court proceedings, while also highlighting other notable legislation. Inquiry for Fair Trial Act, which describes provisions connected to aid convert investigative measures employed by Intelligence Agencies, the Anti-Terrorism Act of 1997, and the Code of Criminal Process of 1898 are also referenced.

QANOON-E-SHAHADAT (ORDER 1984)

According to Article 164 of the 1984 Qanun-e-Shahadat Order, in these kinds of situations, the Court may order the production of whatever evidence it considers appropriate that has become readily available through modern means or procedures and is needed to decide the matter on its merits. Articles 59 and 164 of Pakistan's law code deal with the admission of digital evidence in the form of contemporary technology.

Digital evidence and evidence obtained or stored by a mechanical process are also applicable under Article 46-A of the QSO. The QSO article, which stipulates that only relevant or in-issue facts may be used as evidence, is supplemented by this article. Similarly, a clarification that all electronic papers, including electronic documents, are regarded as primary evidence has been added to Article 73 QSO. (Order of Qanoon-e-Shahadat, 1984).

The Supreme Court ruled in Mian Khalid Pervaiz v. The State (2021 SCMR 522) that documentary evidence that is regarded as digital evidence is admissible under Article 164 of the Qanoon-e-Shahadat order (1984), Articles 46-A and 78-A of the same order, as well as provisions of the Electronic Transactional Ordinance (ETO) of 2002, which sets out a procedure for receiving and establishing such documentary evidence. (Supreme Court, Mian Khalid Pervaiz v. The STATE [2021]). In Shoaib Ahmad Vs. State (2019 PCRLJ 57), the Gilgit-Baltistan Chief Court likewise accepted the acceptance of contemporary gadget evidence under article 164 of Qanoon-e-Shahadat, when the crime was discovered in CCTV footage and the offender was apprehended. Gilgit Baltistan Chief court, PCRLJ (Gilgit Baltistan Chief court), Shoaib Ahmad v. State [2019].

Electronic documents are defined as primary evidence in Article 73, although it is possible to argue that the article pertains to computer-generated information rather than computer-stored information because stored material can be copied further. However, since LHC Judge Mr. Shahid Kareem recently decided that electronic papers will be recognized as primary evidence susceptible to cross-examination, judicial interpretation is necessary.

Additionally, there are requirements for the authenticity, reliability, and admissibility of electronic evidence that must be met globally. These requirements include establishing a chain of custody, ensuring that the evidence was not tampered with or destroyed during collection, and identifying the first responders. In the Qanoon-e-Shahadat order of 1984, article 164 was inserted with the following mentions:

"Construction of evidence that has become accessible due to the use of modern devices; the court may allow producing any available evidence because of modern devices and technology, if consider appropriate." (Usman Hameed, "Admissibility of Digital Evidence: A Perspective of Pakistani Justice System," Pakistan Social Sciences Review 5 (2021) 5).

Modern services were given well, but because they and the communication were done so electronically, there were legal and procedural roadblocks. Unsigned and unattested makers' issues, which led to execution doubts, made it difficult and insufficient for people to have faith in the court's process. With the implementation of the Electronic Transactions Ordinance in 2002, some legal barriers were removed despite the uncertainty of the unsigned proof of the makers through electronic devices under that law. The Electric Transactions Ordinance has since been incorporated into the Qanoon-e-Shahadat order, 1984 under the enactment of Article 2 (e). ('Evidential Representation of Using the Modern Devices and Decision- Making Feasibility in Pakistan' 3 Journal of Law & Social Studies (JLSS), Aftab Hussain Gillani, 2021.

To protect the safety of those handling the evidence, maintain the integrity and quality of the material, and prevent contamination, premature destruction, or degradation are the goals of efficient evidence collecting, packaging, and transportation for forensic DNA analysis. The Punjab Forensic Laboratory shares every information about the correct handling of various materials and evidence on all types of incidents on their website (https://pfsa.punjab.gov.pk/guidelines_for_evidence), including:

a. General Instructions for the Collection, Packaging, and Transportation of Biological Evidence.
b. Packaging of Biological Evidence.
c. Guideline for the Collection, Packaging and Transport of Evidence in Sexual Assault Cases, by using PFSA Sexual Assault Evidence Collection Kits (SAECK).
d. Instructions for the Collecting, Packaging, and Transportation of Biological Evidence in Cases of Deceased Body Identification.
e. Guidelines for Evidence Collection, Preservation and Transportation of Audio-Visual Analysis.
f. The maximum recommended time frames for evidence collection in the cases of sexual assault are as under:

Type of Assault	Maximum Post Coital Time Duration for Evidence Collection
Vaginal	Up to 120 hours (5 days)
Anal	Up to 72 hours (3 days)
Oral	Up to 24 hours (1 day)
Bite marks	Up to 96 hours (4 days)

g. Guidelines for Evidence Collection, Preservation and Transportation of Audio-Visual Analysis.

MAINTENANCE OF DNA DATABASE

The expense to society of maintaining a DNA database is unjustifiably great. According to Tania Simoncelli, who also noted that it would undermine the goals of individual liberty and fairness for all (Tania Simoncelli, "Dangerous Excursions 2006). For nations like Pakistan, where it would cost a lot to create and maintain the necessary infrastructure, creating such a database is not financially feasible. Furthermore, if the right safeguards are not in place, DNA samples are vulnerable to extensive exploitation. Our genetic makeup is stored in our DNA; if a nation maintains a database without taking steps to prevent its misuse through severe Thus, sampled people's right to privacy would be compromised (Khaleda Parven (2013). Nonetheless, there are countless advantages to using DNA evidence, and each nation may profit from it depending on its legal and scientific framework.

There is broad consensus among experts that DNA evidence is not always perfect and unquestionably dependable. Its findings are interpreted, much like the outcomes of all other types of evidence. The assertions that DNA evidence is infallible are refuted by the potential extraction of partial samples, contamination, deliberate implantation of biological material, and the potential for incorrect expert judgements (Encyclopedia Britannica) (2015).

PAKISTAN'S REGULATORY SYSTEM

The courts must operate within the currently applicable legal framework because there is no distinct legal system that handles Genetic evidence. The Qanun-e-Shahadat Order of 1984's (the "QSO") Articles 59 and 164 are taken into consideration while evaluating DNA evidence. In contrast to the second section, which lays out the conditions for the inclusion of various forms of proof made possible by means of preceding paragraph that indicates expert opinion on topics like science and art fits within the purview of "relevant evidence," which has been made possible by advancements in science and technology. A technician who conducts an experiment to investigate DNA evidence is recognized as an expert whose testimony can be utilized in court under the existing legal system.

This legal framework, which is the same as the one governing the admissibility of medical opinions, gives the impression that DNA is a brand-new type of medical evidence and that a DNA expert is different from other types of experts equivalent to a physician. We might not completely profit from the use of DNA if it is only considered from one angle. Genetic evidence, as opposed to medical opinion, reliably identifies offenders, but the former does not. This is the main distinction between the two (2006 SCMR 1786). So, it would be more logical to evaluate it from a different legal perspective. Yet, as we shall see, there is still more ground to be covered because the courts have not applied the law in a progressive enough manner.

COURTS ACCEPT DNA EVIDENCE

The analysis of cases involving DNA evidence that Pakistani courts have ruled on is the focus of this section of the article. The goal of this analysis is to examine the ways in which the current legal system has influenced and molded the judicial philosophy. Two streams of cases have come to light during the analysis: The first addresses paternity/legitimacy, while the second addresses sexual offences. Each of these case streams is subject to a different set of legal standards. DNA testing is not recommended and disregarded in one set of situations, while it is acknowledged but not given the best or most favorable treatment in the other. To give each stream its own attention, I have split this section into two subsections. (PLD 2021 SC 362)

CASES INVOLVING PATERNITY OR LEGITIMACY

Given that Pakistan has a sizable Muslim population, it would seem appropriate to briefly go over some fundamental concepts of Muslim Personal Law to better inform readers about the intricate connection between DNA and paternity problems. According to a well-known saying of the Holy Prophet (PBUH) (PLD 1975 SC 624), a kid is considered to be the responsibility of the person into whose wedlock they are born. Presumption is utilized to compensate for the lack of factual proof when there is a dispute regarding a child's paternity and no direct evidence is available to establish paternity. Muslim scholars disagree on the appropriate time frame for extending fatherhood to a child born following the dissolution of a marriage. According to Article 128 of the QSO of 1984, there are two exceptions to this rule: (a) if the father disowns the kid, and (b) if the child is born more than six lunar months after the woman declares the end of her iddat period.

Given the aforementioned requirements, the paternity legal framework does not provide much room for the admission of DNA evidence. In this instance, the mother and her underage son sued to get maintenance. The petitioner (the father) disowned the child in his response to the claim. In a Family Court application that he filed to support his claim, the petitioner asked for a DNA test of the child; however, his request was denied. After the Family Court rejected his request, the petitioner filed a petition with the Lahore High Court to challenge that ruling. The Court said in its consideration of his petition that determining the legitimacy of a kid has far-reaching significance and shouldn't be treated carelessly since it would have catastrophic consequences. According to the court, the petitioner's claims and his conduct of disowning the child born in marriage required clear proof and trustworthy evidence, both of which were missing from the petitioner's case. The Court emphasized that, in accordance with the traditional perspective upheld by Pakistani law, the legitimacy of a child born in a legal partnership is always believed to be established, and that a simple rejection could never change this since "child follows the bed." The hadith references to the woman's husband as the owner of the marital bed by using the metaphor of a bed. The Court further stated that the petitioner should have used the liyan procedure rather than bringing up paternity for the first time in a maintenance litigation if he had a strong argument.

CONCLUSIVE PROOF BASED ON FORENSIC

On the one hand, this ruling has prompted significant discussion concerning the appropriateness of using the term "conclusive proof" when there's a danger doing so could damage the reliability of the proof, in a legal clause. However, encouraging DNA testing in paternity cases might result in an influx of cases, which would be incompatible with protecting and preserving the family, which is the basic building block of society. These criteria were recently utilized as guideline by the Supreme Court of Pakistan in rejecting DNA testing in paternity cases. In Ghazala Tehsin Zohra v. Mehr Ghulam Dastagir Khan (PLD 2015 SC 327), the Court examined DNA fingerprinting and its implications for establishing paternity in light of Article 128 of the Constitution. A DNA test was sought after the father of two children who were born during a marriage contested his paternity. It was said that Indian courts have begun allowing DNA tests when the legitimacy of children is questioned on the basis that one's wife is unchaste. This was done in reference to Nandlal. The Judge noted:

The language used in Article [128] is supportive of societal cohesiveness and communal values. This appears to be the justification for the affirmative clause that states that a child's birth within two years of the breakup of his parents' marriage—with the mother being unmarried—shall serve as definitive evidence of his legitimacy.

The Court also emphasized that Muslim scholars and QSO legislators were aware of a fetus' gestation period and even then, they increased the presumption of legitimacy to two years, demonstrating "the legislative intent as well as the societal imperative of avoiding controversy in matters of paternity."

In barring DNA evidence in paternity trials, the Supreme Court of Pakistan has generally been governed by Article 128 of the Charter and a preference for the collective interest of society over an individual's interest. The Court further supported its judgment by pointing out that Article 128 is based on the standpoint of a traditionally accepted religion. Hence, Genetic evidence will continue to be disregarded in paternity cases unless that religious viewpoint is reconsidered.

Regarding the claim that collective interest should take precedence over individual interest, it may lead to a different result in a different set of circumstances, as will become clear during our consideration in the second half of this section. The admissibility of DNA evidence in cases of sexual offences is examined in the second half of this section. Although the judiciary's approach to dealing with sexual offences differs significantly from that in paternity cases, it is impossible to ignore the overall influence of the current legal system in defining its parameters.

MANDATORY DNA TESTING IN RAPE CASES

The Peshawar High Court and other superior courts have held in several judgements that it is essential for the investigating officer or agency to perform DNA tests in cases of sexual abuse covered by section 164-B of the Code of Criminal Procedure (CrPC). Section 164-b, Sexual offences, rape and unnatural offence(s), Ccollection of vital evidence, Use of Sexual Assault Evidence Collection Kits (SAECKs), Obligation of Provincial Government to ensure provision of SEACKs and prompt and effective testing of victims of sexual offences. **(**2020 PCrLJ 914 LAHORE-HIGH-COURT).

The Criminal statute (Amendment) (Offences Relating to Rape) Act, 2016, which was passed in October 2016, added the requirement for conducting DNA tests on a victim and an accused to the statute. In addition to other changes, the CrPC now includes sections 164-A and 164-B.

The medical examination of a rape victim in cases reported under sections 376, 377, or 377B of the PPC is covered by section 164-A. The law stipulates that a registered medical professional must examine the victim. It is stipulated that the doctor must examine the victim as soon as possible and write up an examination report with various details, such as a description of the material retrieved from the victim's body for DNA profiling.

When it comes to DNA testing, Section 164-B states that samples must be taken from both the victim and the accused during a medical examination as soon as possible after receiving information about the occurrence of the crime. According to the legislation, DNA samples must be transferred as soon as possible to a forensic laboratory for analysis, where they will be properly checked and maintained.

One of the key rulings in this respect was rendered by Justice Roohul Amin Khan of the Peshawar High Court in December 2017, who ruled that following the law's enactment in 2016, DNA testing of both the accused and the victim of sexual assault was required.

The culprit, Umar Taj, who was accused of kidnapping and sexually assaulting a woman, had asked for bail; the bench had rendered its decision. The bench granted the bail request and made extensive comments regarding the DNA clause. Justice Roohul Amin Khan's thorough ruling covered the provisions of the Criminal Law (Amendment) (Offences Related to Rape) Act of 2016 and the Protection of Women (Criminal Law Amendment) Act of 2006. The federal government passed both of these laws with the intention of protecting women from crimes such as sexual assault, fornication, adultery, etc.

If a crime was committed, attempted to be committed, or was allegedly committed under sections 376, 377, or 377-B of the Pakistan Penal Code, 1860, the investigating officer (IO) shall proceed to collect Deoxyribonucleic Acid (DNA) samples from the victim with that person's consent, or with that person's natural or legal guardian and the accused during the investigation, where possible. In cases where an offence under sections 376, 377, or 377-B of the Pakistan Penal Code, 1860 was committed, attempted to be committed, or was allegedly committed, the investigating officer (IO) shall proceed to collect Deoxyribonucleic Acid (DNA) samples from the victim with his or her consent or with the consent of his or her natural or legal guardian and the accused during the investigation, where practicable.

"By use of word' shall' in section 164-B CrPC, its application has been made mandatory in offence under section 376 PPC," the bench had ruled. Similar to this, the high court last year in another case granted bail to an offender named Akhter Hussain. In the Mardan district, he was charged with kidnapping and sexually assaulting a little girl.

The investigating officer in that instance did not test the victim's and the accused's DNA either. "Laws have changed constantly, and courts hand down judgements in light of those changes. The prosecution department is responsible for informing the investigation officers of recent court decisions as well as significant statute modifications.

SUGGESTIONS

Police organizations must concentrate on relatively verifiable thus requiring more trustworthy technologies like material evidence and crime scene science to remain effective crime-control agents and react to a more attentive society. Additionally, it is crucial for Pakistan's counterterrorism operations that the evidence gathered from crime sites be treated carefully and stored for forensic laboratory investigation in the future, allowing for successful identification.

There is an urgent necessity to establish temporary forensic labs with their working CSU via regional satellite stations in every province since PFSA, which was just established a little more than ten years ago, is the only complete forensics setup in Pakistan. PFSA CSU is modern and up to date for processing crime scenes effectively in the event of an unfortunate incident, however it is further recommended that satellite CSU stations be constructed in each district of Pakistan for quick access to the site.

First responders at the crime site are of utmost importance, hence educating law enforcement forces to priorities police force may be beneficial tactic. It may have been accomplished by allocating a police department to those people who had received this training.

Modern forensics equipment must be made available to police, including CSI vans, gathering evidence kits, Ultraviolet illumination, laser gunshot trajectories gadgets, safety suits, residual print equipment, bullet residue collection kits, stained blood evidence kits, presumption blood detection kits, potable illumination, and inaccessible lighting, among additional items.

QUESTIONS

The following questions from the targeted people related to field of investigation officers, advocates, forensic experts and presiding officers:

1. Do you think that forensic protocols must be used in investigation, to deal with offences related to heinous crime to eradicate criminals?

2. Do you believe that a law enforcement organization should priorities training its police officers given the importance of first responders at crime scenes?

3. Is it correct that forensic science procedures help investigators look into homicides and rapes, including situations involving unidentified remains and effectively locate missing persons?

4. Is it true that due to the comprehensive provision of forensics alone, there are now not enough forensic laboratories to serve Sindh's 20 million inhabitants?

5. Is it correct that the investigation team has not adopted any forensic procedures, so all stakeholders should receive enough training regarding the adoption of forensic practices in crime investigations?

6. Is it true that evidence that is not properly documented, gathered, packaged, and stored will not meet the protocol's requirements for admittance into a court of law in terms of both law and science, leading to the majority of accused parties being found not guilty in rape and murder cases?

7. Do you think that DNA evidence is useful in the Criminal investigation?

8. Is DNA is speedy evidence to decide both civil and criminal case?

9. Is DNA evidence is substantial evidence as required in QSO 1984?

10. DNA provides enough indications and help court to convict an accused and release innocent?

DATA ANALYSIS, FINDINGS AND DISCUSSION

In response of Question “It's true that the majority of investigators are unfamiliar about Forensic Protocols used in criminal investigations to reduce the risk of contamination, which includes?” asking about understanding of forensic procedures needed to preserve the crime scene, manage it, and remove witnesses, as accomplished through a walkthrough of the scene. An investigation was conducted to confirm this, taking into account the testimony from the crime scene and the evidence that was obtained and stored., during examination of targeted samples showed 63.3% lawyers, 86.7% prosecutors, 43.3% Investigators, 100% Forensic experts and 90% presiding officers were agreed on the above questionnaire. While 13.3% Lawyers, 3.3% Prosecutors, 56.6% of Investigators, and none of the Forensic Experts and presiding officers are opposed. Whereas 23.3% lawyers and 10% of both Prosecutors and presiding Officers did not answer the question. In this case strongest support was observed by forensic experts which were 100%. In this matter strongest non supporters were observed by investigators which is 56.7%.

In response of question, which describing that “Do you think that forensic protocols must be used in investigation, to deal with offences related to heinous crime to eradicate criminals?” This was supported by 80% lawyers, 93.3% prosecutors, 80% Investigators, 83.3% Forensic experts and 100% Presiding Officers. While only 3.3% of Lawyers did not support to the questionnaire. Whereas 16.7% lawyers, 6.7% Prosecutors, 20% investigators and 16.7% of forensic experts not answered said questionnaire. In this case strongest support was observed by Presiding Officers which is 100%. While the highest non supporters were 3.3% Lawyers.

In question describing that “Do you believe that a law enforcement organization should priorities training its police officers given the importance of first responders at crime scenes?” This was supported by 63.3% lawyers, 80% prosecutors, 100% Investigators, 70%

Forensic experts and 90% presiding officers. While none of the sample denied the questionnaires. Further 36.7% lawyers, 20% Prosecutors, 30% forensic experts and 10% of the presiding officers did not entertain the questionnaire. In this case strongest support was observed by investigators which is 100%. While none form them were the no supporter in above questionnaire.

During evaluation of question “Is it correct that forensic science procedures help investigators look into homicides and rapes, including situations involving unidentified remains and effectively locate missing persons?” was strongly accepted by 90% lawyers, 83.3% prosecutors, 66.7% of both Investigators and presiding Officer, and 100% of Forensic Experts. While 13.3% Prosecutors, 26.7% Investigators did not accept this questionnaire. While 10% lawyers, 3.3% Prosecutors, 6.7% investigators and 33.3% of Presiding Officers did not answer the said questionnaire. In this case strongest acceptance was observed by Forensic Experts which were 100%, while 26.7% highest non supporters were observed by Investigators.

In response of question “Is it true that due to the comprehensive provision of forensics alone, there are now not enough forensic laboratories to serve Sindh's 20 million inhabitants” was accepted 70% lawyers, 76.7% prosecutors, 86.7% of Investigators, 100% Forensic experts and 80% of presiding officers were agreed. While 3.3% of Lawyers, 13.3% of Investigators are not agreed on questionnaire. Furthermore, 26.7% lawyers, 23.3% Prosecutors, 20% of presiding officers said that this is not applicable on them. In this case strongest support was observed by forensic experts which is 100%. In this case strongest non supporter was observed by investigators which is 13.3%.

When investigating the question that “Is it correct that the investigation team has not adopted any forensic procedures, so all stakeholders should receive enough training regarding the adoption of forensic practices in crime investigations.” was supported by 70% lawyers, 40% prosecutors, 16.7% Investigators, 60% Forensic experts and 70% presiding officers. While it was not supported by 16.7% Lawyers, 53.3% Prosecutors, 76.7% of Investigators, 6.7% of both Forensic Experts and presiding officers. The said questionnaire was not answered by 13.3% lawyers, 6.7% of both Prosecution and investigators, 33.3% forensic experts and 23.3% of presiding officers. In this scenario the strongest support was observed as 70% by both Lawyers and presiding officers. While the strongest non supporters which is 76.7% observed by investigators.

During evaluation of question “Is it true that evidence that is not properly documented, gathered, packaged, and stored will not meet the protocol's requirements for admittance into a court of law in terms of both law and science, leading to the majority of accused parties being found not guilty in rape and murder cases?” The evaluation of the above questionnaire was highly accepted by 80% of both lawyers and prosecutors, 6.7% Investigators, 76.7 % forensic experts, and 80% presiding officers. Further 3.3% Lawyers, 16.7% Prosecutors, 93.3% Investigators, 10% Forensic Experts and 13.3% presiding officers did not accept this questionnaire. Further 16.7% lawyers, 3.3% Prosecution, 13.3% of the forensic experts, 6.7% presiding officer did not answer the said questionnaire. In this evaluation strongest acceptance was observed by trice Lawyers, Prosecutors and presiding officers which is 80%, while 93.3% were highest non supporters observed by Investigators.

The result of question “Do you believe Genetic evidence may be helpful in a criminal investigation? During the evaluation of the above questionnaire was highly accepted by 100% by Forensic Experts, and 90% of both lawyers and Presiding Officers, and 70% Prosecutors, 40% Investigators. Further 10% Lawyers, 23.3% Prosecutors, 56.7% Investigators, 10% Presiding Officers and 0% Forensic Experts did not accept this questionnaire. Further 6.7% Prosecution, 3.3% Investigators did not answer the said

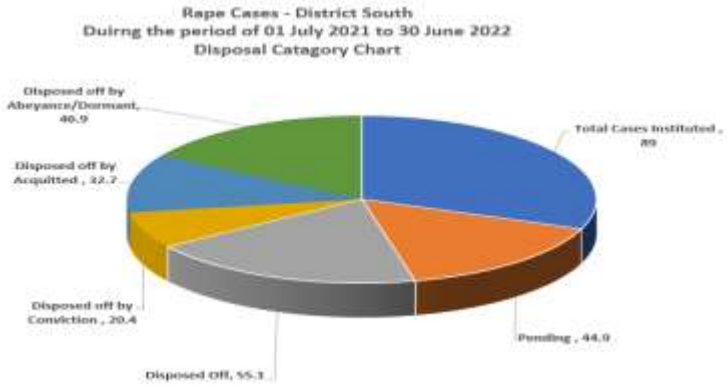
questionnaire. In this evaluation strongest acceptance was observed by Forensic Experts which is 100%, while 56.7% were highest non supporters observed by Investigators.

In the matter of evaluation of question, "Can DNA quickly resolve both civil and criminal cases?" The evaluation of the above questionnaire was highly accepted by 86.7% of Forensic Experts, 80% Lawyers, 76.7% of Presiding Officers, 40 % prosecutors, and 16.7% investigators. Further 16.7% Lawyers, 56.7% Prosecutors, 70% Investigators, 6.7% Forensic Experts and 16.7% presiding officers did not accept this questionnaire. Furthermore, 3.3% both lawyers and prosecutors, 13.3% of investigators, 6.7% both forensic experts and presiding officer did not answer the said questionnaire. In this evaluation strongest acceptance was observed by Forensic Experts which is 86.7%, while 70% were highest non supporters observed by Investigators.

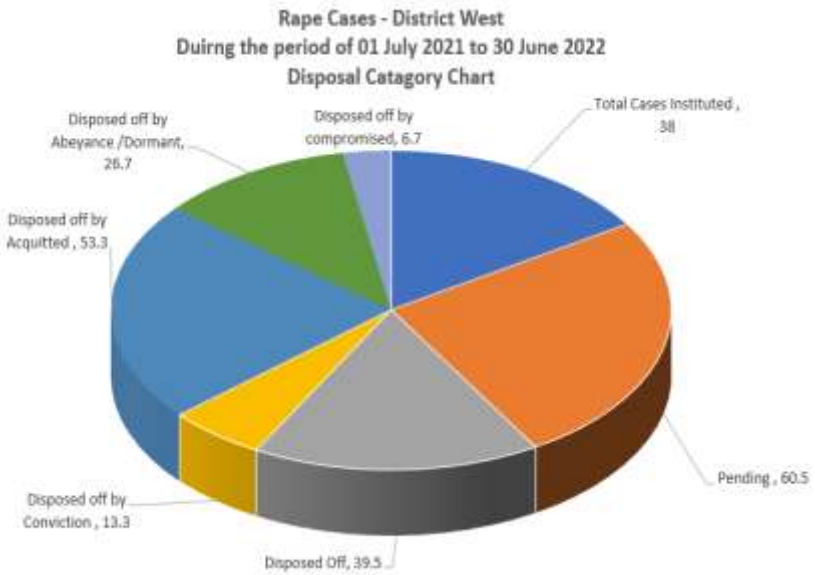
During the course of evaluation of question, "Does DNA evidence qualify as substantial evidence under QSO 1984?" The evaluation of the above questionnaire was highly accepted by 100% of Forensic Experts, 93.3% both Lawyers and Presiding Officers, 90% Prosecution, and 30% Investigation. Further 6.7% Lawyers, 10% Prosecutors, 46.7% Investigators did not accept this questionnaire. Further 23.3% investigators, 6.7% of the presiding officer did not answer the said questionnaire. In this evaluation strongest acceptance was observed by Forensic Experts which is 100%, while 46.7% were highest non supporters observed by Investigators.

In the evaluation of question, "DNA gives the court sufficient evidence to convict the criminal and free the innocent". This evaluation was highly accepted by 100% of Forensic Experts, 86.7% both Lawyers and Presiding Officers, 70% Prosecutors, and 60% of Investigators. Further 10% Lawyers, 23.3% Prosecutors, 26.7% Investigators, 3.3% Presiding Officers did not accept this questionnaire. Further 3.3% lawyers, 6.7% Prosecution, 13.3% of the Investigators, 10% presiding officer did not answer the said questionnaire. In this evaluation strongest acceptance was observed by Forensic Experts which is 100%, while 26.7% were highest non supporters observed by Investigators.

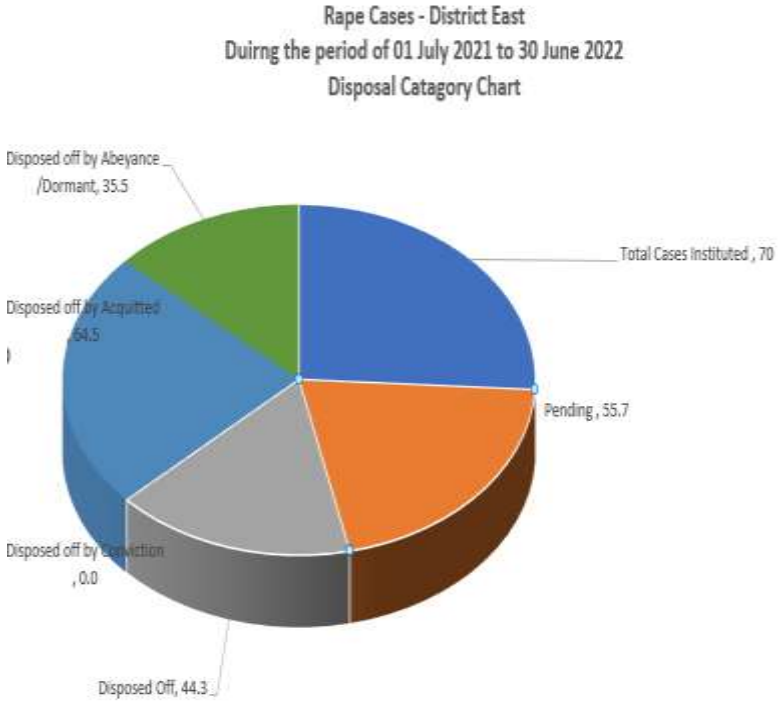
Rape Cases Of District South



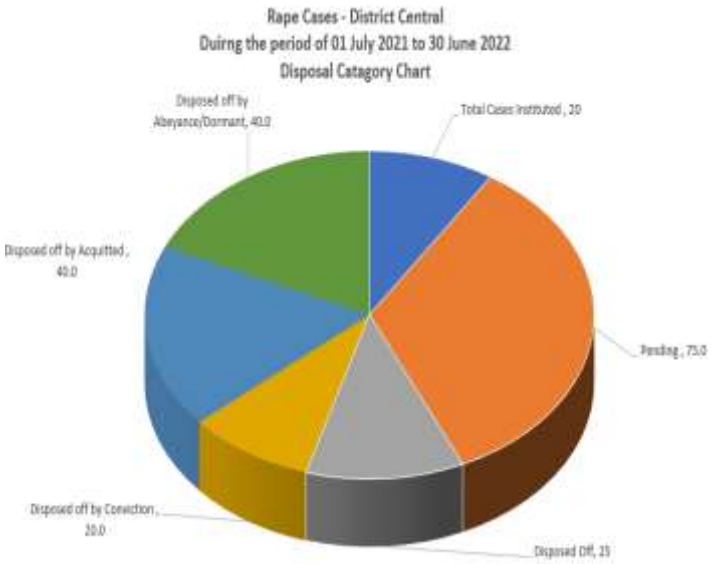
Rape Cases Of District West



Rape Cases Of District East



Rape Cases Of District Central



FINDINGS AND DISCUSSION

Everyone's DNA is unique, making DNA a valuable tool for law enforcement investigations in every person (except for identical twins). By examining particular DNA sequences, or loci, a crime lab can develop a profile that can be used to identify a suspect. By analyzing particular DNA loci or sequences, a crime lab can provide a profile that can be used to identify a suspect. A dishonest judiciary looks for the truth. The advancement of DNA forensics aids in the pursuit of the truth and aids law enforcement and prosecutors in preventing violent crimes. DNA evidence enables the establishment of facts that exonerate the innocent and helps the prosecution to prove the guilt of an accused person.

Many tools exist for DNA analysis in cases where DNA evidence is relevant. They fall under one of four categories: Suspicion/Personal Confirmation/Personal Removal: Men or women identified as bearing the stain of the crime; Bloodless Match: Utilizing database/archived comparison matches to identify an unknown suspect using crime colour; next-generation applications: Genealogy, Genealogical Database Research, and DNA Phenotyping; Related Crime Matching: Identification of Related Crimes/Serial Crimes Through Matches Between Crime Scenes. The following case studies serve as illustrations of these uses. Even while there are several instances where each of the costs associated with forensic DNA analysis is viewed as "useful" in resolving a crime that would otherwise go unresolved (van der Beek, 2015), the overall price is still modest.

Although DNA analysis has a strong medical foundation, numerous obstacles limit its widespread use. Because some forensic audiences and stakeholders are uncertain about the limitations and benefits of DNA, it is imperative to explore these topics (Amankwaa, 2018; Machado and Silva, 2019; Skinner and Wienroth, 2019). Problems with police detective work's brevity have been noted by certain studies because to its overreliance on DNA data (McCartney, 2006). The UK NDNAD health, which is now a significant metric is around 65% (FIND Strategy Board, 2020) for assessing database performance. Although this output parameter is important for assessing a database's potential efficacy, it does not presently take into account the overall cost of employing DNA or databases for all criminal proceedings.

The identity of the suspect and the circumstances of the victim (example rape) can be linked through careful examination of the data. It is technically conceivable to record shoe prints and fingerprints as tool marks. Casting kits and other forensically relevant equipment were employed (MacDonnell, 1983). Moreover, footprints can offer hints that help identify suspects and victims. Plasma, secretions, urination, vaginal fluids, mucus, faeces, and vomit are examples of biological fluids (Lyman, 2002). They contribute DNA. They are gathered in sterile receptacles for scalpel-based laboratory analysis (Redsicker, 1991).

Notwithstanding, the air of trustworthiness related with DNA advancements creates assumptions which are regularly misrepresented and separated from the substantial truth of criminal examination. It is along these lines fundamental to perceive and distinguish the potential dangers emerging from the utilization of DNA innovation, to forestall potential blunders and dangers to social equality—including maintaining the assumption of honesty, hereditary protection and the good and actual trustworthiness of suspects or people blamed for violations (McCartney, 2006; Murphy, 2007; Nuffield Council on Bioethics, 2007).

It is possible to carefully evaluate the suspect's and victim's circumstances (for instance, rape). Technically, it is possible to record fingerprints, shoe prints, and tool prints. Casts and further forensic tools were utilized (MacDonnell, 1983). Moreover, footprints can offer hints that help identify suspects and victims. Examples of biological fluids include blood, semen, urine, vaginal fluids, vomit, faeces, and saliva, (Lyman, 2002). They contribute DNA. With the aid of a scalpel, they are gathered into sterile receptacles for laboratory examination (Redsicker, 1991).

The credibility around DNA development, however, breeds presumptions that are frequently erroneous and disconnected from the reality of criminal investigations. In order to avoid mistakes and threats to social equality, it is crucial to identify and separate potential risks connected to the implementation of DNA breakthrough in this regard. Examples include the assumed innocence, the accuracy of genetic data, and the sincerity and goodwill of suspects especially individuals who have been suspected of crimes. (McCartney, 2006; Murphy, 2007; Nuffield Council on Bioethics, 2007). 89 rape-related criminal cases were started in total in the years 2021 and 2022, according to analysis of the statistics on rape cases for both years covering the District South, total 89 cases of offences related to Rape were instituted, till to the sampling period of one year 49 (55.1%) cases were disposed and 40 (44.9%) are pending. If we discussed about the nature of disposal cases, out of 89 total instituted cases 49 (55.1%) cases were disposed, in which conviction ratio is only 20.4% (i.e 10 Cases), whereas 32.7% (16 Cases) acquitted due to lack of evidence, and surprisingly 46.9% (23 cases) are become Abeyance/ dormant due to different reasons or accused absconders etc. In District West, total 38 cases of offences related to Rape were instituted, till to the sampling period of one year 39.5% (15 cases) were disposed and 60.5% (23 Cases) are pending. If we discussed about the nature of disposal cases, out of 38 total instituted cases 15 (39.5%) cases were disposed, in which conviction ratio is only 13.3% (2 Cases), whereas 53.3% (8 Cases) acquitted due to lack of evidence, surprisingly 26.7% (4 cases) are become Abeyance/ dormant due to different reasons or accused absconders etc and in 6.7% (1 Case) parties are compromise each other.

In evaluating the rape cases of District East, total 70 cases of offences related to Rape were instituted, till to the sampling period of one year 31 (44.3%) cases were disposed and 39 (55.7%) are pending. If we discussed about the nature of disposal cases, out of 70 total instituted cases 31 (44.3%) cases were disposed, in which conviction ratio is only 0.%, whereas 20 (64.5%) acquitted due to lack of evidence, and surprisingly 11 (35.5%) cases are become Abeyance/ dormant due to different reasons or accused absconders etc. While evaluation of cases in District Central, total 20 cases of offences related to Rape were

instituted, till to the sampling period of one year 5 Cases (25% cases) were disposed and 15 Cases (75% are pending). If we discussed about the nature of disposal cases, out of 20 total instituted cases 5 (25%) cases were disposed, in which conviction ratio is only 20% (1 case), whereas 40% (2 Cases) acquitted due to lack of evidence, and surprisingly 40% (2 cases) are become Abeyance/ dormant due to different reasons or accused absconders etc.

CONCLUSIONS

Whenever a crime occurs, police officers, detectives, investigators, and forensic specialists are at the scene of every incident. They gather data that is then used to support conclusions or opinions made in court after being processed and examined at a forensic laboratory.

In both criminal and civil court cases, the conclusions and statements of forensic experts are an important means of evidence. In accordance with the relevant legal requirements of forensic expertise and interaction their study findings are appropriately incorporated into the proceedings in both civil and criminal contexts. If the witness, for example, is knowledgeable about the pertinent laws, the expert opinion is thought to be of high quality.

Science has recently advanced quite quickly, as have contemporary technical advancements and forensic research. Thus, forensics is a rapid, reliable, and affordable way to solve crimes. It is also considered crucial to participate in non-criminal forensic civil trials because of this observation or opinion, it determines the truth of the fabric.

New avenues in forensic science have been made possible by DNA. Whatever significance DNA evidence may hold, the country's current judicial system and scientific infrastructure will determine how it is used. According to the data above, DNA evidence is not universally accepted in Pakistani investigations due to a number of legal obstacles. In one sense, the admissibility of DNA in paternity disputes is excluded due to the assumption of imperative law favoring divorce. In this case, the court prioritized the legitimacy of future generations over individual interests in revealing the truth, as well as the group interests of the community. This structure complies with Islamic criteria, too, according to contemporary legal opinion. It is therefore unlikely that DNA evidence would have been accepted in this case. On the opposite side, Forensic evidence is recognized and considered as a sort of expert evidence in sex crime tribunals.

In Pakistan, the application of biological evidence to other crimes is essentially nonexistent. This legal strategy is based in part on the existing legal system and in part on a both a lack of technical knowledge and the ability to assess criminal investigations. When crime scenes are thoroughly analyzed, we may be able to collect DNA evidence from them, especially from violent crime and murder scenes, but this crucial information is typically lost owing a lack of manpower and scientific infrastructure.

Physical proof is the same as forensic evidence under Pakistan's current legal system is equated with expert evidence, which significantly reduces its value. Law enforcement officials are reluctant to give DNA evidence more credence than they would normally give medical or other expert testimony because they are informed and aware of the assumptions based on their expert testimony. As a consequence, DNA evidence lost its potential to serve as core evidence and was relegated to the status of support or secondary evidence. Until Genetic evidence is emancipated from this materialist approach, it is going to be challenging to utilize its maximum power. The

current legal system must be completely reevaluated in order to make the most of Genetic evidence and make it primary evidence.

When mistake is removed by creating suitable processes at all levels, including the finding, collecting, storage, and management of Genetic data, DNA evidence is deserving of being used as valid evidence. Smart legislative action, even within the current legal framework, can add scrutiny to the existing legal strategy. The courts' current strategy, where it sidesteps the investigative process and delivers justice by remaining stagnant despite its failure to gather substantial evidence must be corrected.

The above improvement could be made by increasing the awareness of court officials about the importance of DNA evidence. Pakistani courts would be encouraged to gather and use DNA evidence where appropriate via a minimal inquisitorial method, and any investigating agency that fails in this regard will be held accountable. This modification decreases the likelihood of losing a crucial piece of evidence by reminding police officers of the significance of DNA evidence.

Forensic evidence is equivalent to physical proof under Pakistan's current legal system is equated with expert evidence, which significantly reduces its value. Law enforcement officials are reluctant to give DNA evidence more credence than they would normally give medical or other expert testimony because they are informed and aware of the assumptions based on their expert testimony. DNA evidence lost its ability to be primary evidence as a result of being relegated to secondary or supporting evidence. It will be challenging to realize the full potential of DNA evidence until it is liberated from this reductionist mindset.

To make the most of DNA evidence and make it the dominant form of evidence, the current legal system must be completely reevaluated. When the chance of error is removed by creating suitable processes at all levels, including the discovery, collecting, storage, and management of DNA samples, DNA evidence deserves to be used as proof. Smart legislative action, even within the current legal framework, can add scrutiny to the existing legal strategy. The courts' present strategy, where it sidesteps the investigative process and delivers justice by remaining stagnant despite its failure to gather substantial information must be corrected.

Another improvement could be enhanced by raising the awareness of court officials about the importance of DNA evidence. Pakistani courts will be encouraged to gather and employ Forensic evidence where appropriate by using a limited inquisitorial strategy, and any investigating agency that fails to do so would be held accountable. This modification decreases the likelihood of losing a crucial piece of evidence by reminding police officers of the significance of DNA evidence. Pakistan also has to begin building the scientific foundation required to locate and preserve Genetic evidence, otherwise justice and fair play will be lacking.

RECOMMENDATIONS

1. It's true that some open abuse research facilities require help in acquiring tools and supplies to direct the fundamental DNA research cycles of extraction, quantification, intensification, and testing, as well as in adhering to various accreditation standards.
2. The abuse testing facility must include a robotic frame, such as a mechanical DNA extraction unit, in order to streamline the labor-intensive and time-consuming portion of the DNA testing approach. The utility of computational DNA research

frameworks is increased for professionals while limiting contamination and human mistake.

3. The forensic lab focuses on a diverse range of DNA data research projects. The Nuclear DNA Program provides advanced specialist support in scalable disciplines and sub-disciplines through integrated skills and capabilities to help federal, state, regional, and international agencies of law enforcement.

4. DNA knowledge in criminology is expanding quickly. Working on speedy DNA screening tests requires innovative equipment that will allow abuse research companies to undertake DNA research quickly. An organization's capacity to handle more instances would increase with a research apparatus that is less complicated, quicker, and less redundant. The concentrate of DNA research activities will remain on the surrounding regions for the foreseeable future.

5. DNA measurement research is developing quickly. The goal of working towards optimal DNA testing research depends on the operation of modern instruments that will allow abuse laboratories to conduct quick DNA research. Simpler, quicker, and less redundant research methods will increase a center's capacity to handle more cases while decreasing capital speculation. The following areas will receive the majority of DNA research attention throughout the coming longer period:

a. The establishment of "DNA chip innovation," which makes use of nanotechnology to accelerate up and achieve certain DNA research objectives. With the help of this innovation, research will require only minutes instead of hours, resulting in a segment reduction that is financially sustainable.

b. Encourage more proactive ways to help more research facilities advance their analysis of polluted, antiquated, or otherwise compromised artefacts.

c. Advanced application of several DNA testing techniques, such as B. Computerized, mitochondrial DNA (mtDNA), single nucleotide polymorphism (SNP), Y chromosomal DNA and short tandem repeats (STR) tests.

d. The utilization of DNA from microorganisms, plants, and animals to produce hints that can correlate DNA identified on or nearby human culprits or victims to the real offenders.

e. Scientific advancements that make it possible to identify DNA evidence from numerous tests brought on by large-scale catastrophes or large-scale casualties.

f. New technologies that make it possible to more effectively separate real-time DNA evidence from a male sexual attacker from a female victim.

g. Law enforcement personnel who attend to a crime scene must be able to recognize, gather, and safeguard organic evidence that is sufficient to be used in an abuse laboratory. Important evidence may be missed or not be readily available for evaluation as a result of improper classification. In FY2004, this effort contributed $3.5 million to help meet the legal requirements for officer readiness:

- Comprehensive training in the principles of DNA evidence for police officers and other on-duty staff; preparation for the identification, collecting, and preservation of potential genetic evidence for experts, detectives, and anybody working with crime scenes in storage

- Preparing data for initiatives that will allow lawmakers and policy makers to work with better informed options for useful DNA testing evidence and tools; preparing and educating specialists and DNA responders and their ability to offer direction in both "hot" and "cold" instances.

- A review of the judicial system and the magistrates' authority to oversee criminal investigations, particularly those involving serious crimes. A study of the practical application of the supervisory role of magistrates in actual cases, including the challenges faced by magistrates and the impact of their supervision on the quality of investigations.

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