

THE LEGAL STATUS OF GENETIC TESTING AND DNA EVIDENCE IN PAKISTANI COURTS

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ABSTRACT

This research will discuss the legal position of genetic testing and DNA evidence in Pakistani courts and how genetic testing is becoming increasingly important in the criminal justice system. DNA testing is becoming an acceptable forensic instrument, particularly in matters of sexual crimes, paternity cases, and murder cases. Courts have become open to the usage of DNA to support, but not necessarily rule out, evidence and this has evolved into Pakistani jurisprudence. Its admissibility and the procedural regulation have been extended by legislative changes, including amendments to the Qanun-e-Shahadat Order and certain clauses of the criminal laws. Nevertheless, there are still problems such as insufficient forensic infrastructure and missing standardized testing procedures, visible chain-of-custody problems, and insufficient judicial education on scientific evidence. Privacy, consent, and data protection issues are also ethically complex and make their use even harder. In general, the legal environment can be characterized by a slow yet consistent acculturation of genetic evidence, which indicates the necessity to provide more transparent statutory regulations, enhance forensic capabilities, and reinforce the protection of justice.

Keywords: challenges, historical context, laws, opportunities, theoretical context

INTRODUCTION

Incorporation of genetic testing and DNA evidence into the Pakistani judicial system has been a great breakthrough in the field of forensic science and prosecution (Razzaq et al., 2023). The DNA evidence contains objective and scientifically provable information, which can either highlight or refute the testimony of a witness, particularly in criminal cases such as homicide, sexual offence, and paternity cases (Ali, 2023). However, despite

its promise, there is no applicable statutory framework of DNA evidence enacted by Pakistani courts; rather, relying on the general provisions of the Qanun-e-Shahadat Order 1984, particularly Articles 59 and 164, that permit the use of expert testimony and scientific evidence in court, it has resorted to the general provisions of that statute (Abbas et al., 2024; Ahmed et al., 2025).

The judiciary members in Pakistan have reserved attitudes towards DNA evidence. The general rule used by the courts to accept DNA reports is that they are not conclusive evidence but corroborative evidence, which is an evidentiary rule that presumes the importance of oral testimony and circumstantial evidence (Saddique et al., 2025). The practicality of the DNA evidence in family law concerning the matter of paternity or legitimacy is limited by courts being reluctant to use it as a priority as compared to the established social and religious conventions (Raza et al., 2023).

Among the problems such cases can bring are a lack of adequate forensic facilities, a lack of standardized testing methods, and an inefficient judicial system to interpret complex scientific findings, which are admissibility and reliability of DNA evidence (Jatoi et al., 2021). Ethically, it is not convenient to utilize either since it poses consent, privacy, or data protection challenges (Kausar et al., 2024).

In general, DNA analysis has the potential to become a revolutionary solution to the forensic legislation in Pakistan, yet it needs to be implemented with a more specific legal framework, a set of more effective forensic tools, and an overall understanding of the judicial system to achieve the accuracy, reliability, and justice of the legal process (Abbas et al., 2023).

Research Justification

It is important to study genetic testing and DNA evidence within the Pakistani court system in view of the growing role of scientific evidence in the court system. DNA analysis will give objective and reliable evidence that can clear the cases involving paternity and sexual crimes, as well as homicide. Although it is important, the courts of Pakistan differ in the ways of accepting and interpreting the DNA evidence, which leads to a lack of consistency in court rulings. Specific research is needed here to identify legal, procedural and ethical concerns in the use of genetic testing in the courts.

Presently, there is no specific law for the use of DNA evidence in Pakistan; the provisions in this regard are general and are interpreted in the Qanun e Shahadat Order 1984. The restrictions are also in practice, such as the absence of

appropriate forensic laboratories, standardized testing methods, and adequate training of judicial officers, which makes it difficult to put the methods into practice. Exploring these issues can provide a measure of insight into how to better operate and how to apply DNA evidence in the legal system.

Not only that, but the research is also to know the theoretical overlap of science and law, and maintain equilibrium between technology advancement and moral responsibility. This research will ensure that DNA evidence is utilized in a way that is fair, reliable and effective to increase the credibility, accuracy and efficiency of the legal system in Pakistan and also to encourage justice and legal certainty.

Literature Review

The available literature on DNA evidence and genetic testing in Pakistan has indicated that it has acquired significance, and it has become hard to utilize in the courts (Rasool & Rasool, 2020). It can be argued that the Qanun e Shahadat Order 1984, especially the provisions of Articles 59 and 164, creates a legal framework to accommodate expert and scientific evidence to have access to DNA reports to use them in criminal and civil cases (Abbas et al., 2024; Zia et al., 2021). They underscore the fact that DNA analysis can objectively either validate or disprove a host of arguments in the homicide, sexual offence and paternity conflict cases and can be a highly plausible corroborative evidence (Ajmal & Rasool, 2022). It is also found that although the number of courts that have accepted the scientific validity of the DNA testing results (Abbas et al., 2023).

A number of researchers point to the barriers to the successful utilization of DNA evidence in the form of structural and procedural issues (Rasheed, 2025). It should be mentioned that the insufficiency of the forensic lab, the lack of a standardized set of guidelines, and the timeliness of the tests and reports decrease the reliability of genetic evidence (Hussain et al., 2024). In addition, any chain-of-custody, mishandling of samples, and the absence of judicial and investigative training also decrease the touchability of DNA, which further slows down the resolution of the cases in

the court or leads to the wrongful acquittal (Ali, 2023).

Social and legal issues of the use of DNA in sensitive cases are also addressed in the literature. Saddique et al. (2025) state that the courts are not eager to prioritize DNA evidence in a paternity, legitimacy, and inheritance lawsuit, as it contradicts the social norms and religious interpretations. Likewise, DNA evidence is often used in sexual cases as corroborating, as opposed to decisive, and has a restricted influence on court verdicts (Uzair et al., 2024).

Another challenge to the Pakistani situation is the pendulum between scientific evidence and the current socio-cultural and legal norms. Together, the works prove that the necessity to possess a more advanced forensic system, a clear legal framework, and the increased judicial awareness of the fact that the maximum potential of the DNA evidence can be leveraged to bring justice to Pakistan is just and appropriate (Raza et al., 2023).

Historical Context of the Legal Status of Genetic Testing and DNA Evidence in Pakistani Courts

An overview of the history of the use of DNA evidence in Pakistan shows a slow acceptance of the technology by the judicial system, which started with the skepticism of the judiciary (Abbas et al., 2024). Pakistani early courts mostly depended on oral testimony, circumstantial evidence, and documentary evidence, and scientific evidence had an insignificant role in it (Kausar et al., 2024).

With the advent of DNA technology in the late 1990s and early 2000s, there was an element of a scientific aspect in criminal cases, especially in paternity cases, homicide cases and sexual offence cases (Farooq & Waheed, 2013). The earliest cases revealed the vagueness of the procedures and judicial reluctance to consider DNA as a conclusive piece of evidence that triggered academic discussions of its admissibility in the legal system and its quality of evidence (Noor et al., 2025).

In the course of time, legislative and procedural changes were made to allow a more judicial acknowledgment of the DNA testing. The admissibility of expert scientific evidence, such as a DNA report, as corroborative evidence was based

on the Qanun e Shahadat Order 1984, which was amended and interpreted in a number of rulings (Rasheed, 2025). Eventually, the court accepted the validity of the use of DNA analysis, and attention turned to the necessary procedural safeguards, chain-of-custody, and expert testimony (Raza et al., 2023).

The other thing that current literature notes is that even with the enhanced degree of tolerance, structural constraints, the absence of homogenous testing procedures, and socio-religious issues continue to be factors contributing to the judiciary process, which is a historical process of slow integration of genetic evidence into the Pakistani law (Saddique et al., 2025).

Theoretical Context of the Legal Status of Genetic Testing and DNA Evidence in Pakistani Courts

Theoretical contexts the theoretical context of DNA evidence in Pakistan is based on the principles of evidentiary principles and forensic science, which are focused on objectivity, reliability, and probative value. The scientific data derived by the methods of DNA can be used as a justification to waive off the admissibility of the DNA evidence because scientific data can assist the courts of law in making decisions and offer a more valid foundation to determine facts. In DNA analysis, the positivist approach to law is applicable because empirical and verifiable evidence becomes more important to eliminate the need for using subjective testimony and circumstantial evidence to enhance the credibility of the ultimate judicial results.

In terms of forensic science, DNA evidence is an instrument that can be used to foster fairness and accuracy in the criminal justice system. The theoretical implementation of it encompasses the balance between probative value and the procedural integrity, the adequate collection, storage and interpretation of the biological samples. The framework also considers ethical and legal issues, including privacy, consent and the protection of genetic information, and these are used in a responsible manner during the legal process. Overall, the theoretical discussion serves to reinforce that DNA evidence is not just a step of a scientific procedure, but also a legal tool that

supports evidentiary credibility, leads to judicial confidence and is part of the broader aims of justice. The DNA evidence is an example of how the effectiveness and fairness of the Pakistani legal system can be improved through empirical evidence, in conjunction with legal reasoning.

Laws Regarding Genetic Testing and DNA Evidence in Pakistani Courts

Pakistan has a multi-layered legal system that governs the usage of DNA evidence. It is a model that incorporates the statutory laws and the evidentiary regulations to offer consistent and forensic analyses that are reliable as well as legally admissible. The system is also instrumental in putting complex scientific evidence into a form of plausible court evidence in order to deliver fair justice in a court of law.

1. The Qanun-e-Shahadat Order (QSO) 1984: This is founded on the Qanun-e-Shahadat Order (QSO) 1984, which gives general rules of evidence. Although DNA is not mentioned directly, the QSO permits scientific evidence through Expert Testimony. Articles 59 and 164 allow the courts to use forensic genetic analysis in cases when the investigations are performed by the competent authorities and are deemed to be relevant and reliable. This is the basic legal instrument of stealing scientific findings.

2. Code of Criminal Procedure (CrPC) 1898: Code of Criminal Procedure (CrPC) 1898 is the legislation that regulates all the investigations and trials as the procedure law requires. The court rulings encourage the application of DNA profiling to major offences. The CrPC is also necessary since it allows the investigators and the courts to request medical and forensic examinations formally. This helps in the lawful acquisition of biological specimens to apply as DNA evidence during cases such as sexual offence, murder and even paternity.

3. The Anti-Rape (Investigation and Trial) Act 2021: The Anti-Rape (Investigation and Trial) Act 2021 made a significant change. This was one of the laws that brought about the obligatory character of DNA testing in cases of rape and sexual violence. The Act imposes an obligation upon the police and the medical personnel to ensure that the collection, preservation and

forensic examination of the biological evidence is completed in a timely manner and in rigid standardized conditions. They ought to come up with the results under the name of well-accredited forensic laboratories.

4. The Punjab Forensic Science Agency Act 2007:

The concept of scientific analysis is codified in the PFSA Act 2007 and other similar laws, implying that the DNA testing is conducted by certified professionals under oath, which is validated and reliable. This is a self-confidence of the judiciary. The acts further demand the chain of custody and accreditation of the laboratories in terms of the integrity of evidence. Admissibility of DNA test.

Challenges for Genetic Testing and DNA Evidence in Pakistani Courts

Although the use of DNA evidence in the Pakistani judicial system is increasingly being recognized, there are many issues that impede its successful application and legal validity. Among the most important problems, the absence of standardized forensic practices between investigative agencies should be mentioned. Proper training in the collection of evidence in police departments is lacking, which in most cases results in contamination, poor storage, or delays that destroy the integrity of the DNA samples. Poor chain-of-custody systems also put into question the authenticity and admissibility of forensic evidence in courts. The other significant challenge is the low supply and distribution of certified forensic laboratories. Although there are high standards maintained in institutions, such as the Punjab Forensic Science Agency (PFSA), other parts of the country are underserved, thus leading to inconsistency in the quality of DNA testing in different parts of the country.

This gap tends to cause reports taking a long time, congested labs, and analysis errors. There are also legal ambiguities as a result of the lack of a detailed DNA-specific law. Pakistan does not have a definitive law regulating DNA databases, privacy rights, retention period, consent and disclosure of ethical utilization of genetic information. In the absence of strong data protection regulations, there is a worry that it can be violated, abused or infringe on personal rights.

The other challenge is judicial interpretation. To a large extent, this is because courts do not consider DNA to be conclusive testimony; many judges lack the proper training in scientific analysis. Such inconsistency means that they will have judgment differences in similar cases, which weakens consistency in legal practice. The adoption of DNA evidence is also influenced by cultural, religious and ethical reasons. Some of the interpretations of Islamic jurisprudence focus on traditional evidentiary controls, and thus, there is reluctance among some judges to lean towards scientific demonstrations at the expense of well-established legal norms.

Lastly, there is the issue of logistics, which is seen to hamper the entire system due to delays in medico-legal examinations, inadequate cooperation between the police and forensic departments and the absence of technological facilities. All these issues point to the necessity of more powerful laws, better forensic infrastructure, and judicial capacity-building and nationwide standardization in a bid to make the use of DNA evidence in Pakistani courts reliable and effective.

Opportunities for Genetic Testing and DNA Evidence in Pakistani Courts

Regardless of the current issues, the legal and forensic environment in Pakistan has a number of positive opportunities to enhance the presence of genetic testing and DNA evidence in the courts. An institutional focus on forensic science is one of the greatest opportunities, and it is reflected in the creation of provincial forensic agencies, such as the Punjab Forensic Science Agency (PFSA). These laboratories offer testing facilities that are internationally recognized, which form the basis of a national standard and better reliability of the forensic findings. The possibility to expand such agencies to other provinces will guarantee the availability of high-quality DNA testing in the country.

There are also good prospects of changes through legislative reforms. The Anti-Rape (Investigation and Trial) Act 2021 has already imposed the use of forensic evidence in cases of sexual offence, which has set a precedent of law that may regulate or govern the DNA databanks, preservation of privacy, and chain of custody. The present

momentum in criminal justice reform gives a good opportunity to institute the comprehensive DNA legislation to make it clear when genetic material should or should not be admissible, preserved, and used in life-related matters.

More possibilities arise out of the progressive openness of the judiciary toward scientific evidence. The development of more judicial training programs, typically with the help of the Judicial Academy, opens up room where judges can better comprehend the principles of forensic science so that they can evaluate the DNA evidence they receive with some consistency and confidence. This may result in a more consistent jurisprudence and even greater precedential worth. Increased opportunities for accuracy and efficiency are made available by technological advancements.

Automation, better extraction methods, and increased speed of DNA profiling systems save time, increase the reliability and also reduce human error. Also, the involvement in the global forensic networks and scholarly partnerships offers the chance of embracing the best practices in the world. Such collaborations can be used to promote laboratory accreditation, uniform practices and police, prosecutors and forensic expert training. Lastly, increasing awareness and demand for scientific fairness in criminal trials among the general population compels policymakers to focus on forensic reforms. All of these opportunities can lead to the high credibility, acceptance and legal integration of DNA evidence in Pakistani courts.

Discussion

The increased use of DNA evidence and genetic testing in Pakistani courts is an indicator of a bigger movement of scientific modernization of the justice system. However, the extent of influence of the DNA evidence on the decision-making process of the courts is subject to the intensity of the legal, institutional, and procedural environment in which it is implemented. In spite of the fact that such laws, such as the Anti-Rape (Investigation and Trial) Act 2021, indicate the desire of the state to integrate forensic technologies, they are not implemented due to the absence of infrastructure and capacities.

The skepticism of the judicial system, leaning to the secondary but not to the primary role of the DNA evidence, shows that there is tension in the contact between the norms and traditions of the evidentiary and of the scientific. This is a positive attribute of not over-reliance on forensic evidence, but it can equally be a vice to achieving the full potential whereby biological evidence is in the limelight of proving guilt or identity.

In addition to it, there are immediate ethical concerns (privacy, consent, and data protection). The future of using DNA can raise the issue of misuse or violation of rights, and no elaborate legal structure will govern the usage of the genetic data. Overall, it seems that Pakistan is standing at the crossroad of its history: as the infrastructure is being expanded, the laws are being pushed forward, and people are becoming more conscious about the challenge of forensic ecosystems, there is much that could be done to change the situation on the national level, provided such issues are addressed in a well-thought manner with the assistance of the legislation, policy, and judicial training.

Conclusion

The interplay of science and law has taken a new legal form in Pakistani courts, which involves genetic testing and DNA evidence. DNA evidence is also gaining acceptance as an effective tool for identity establishment, paternity resolutions, serious crimes and sexual offences.

Institutionalization of forensic testing through legislative reforms, including the Anti-Rape (Investigation and Trial) Act 2021, and the development of provincial forensic agencies, has provided a ground on which forensic testing can be standardized and reliable.

Nevertheless, there are still difficulties, such as the inadequate laboratory capacity, poor chain-of-custody procedures, intermittent judicial interpretation, and lack of comprehensive legislation of genetic data. Lack of ethics surrounding privacy and consent is an issue that makes it harder to integrate legally. Nevertheless, Pakistan has a chance to enhance the forensic and legal system with the diversified infrastructure, judicial education, technological innovation, and by passing special DNA laws. DNA evidence can

be one of the pillars of the proper, just, and scientifically supported adjudication in a country with systematic reforms.

Recommendations

To enhance the juridical standing and overall effectiveness of the genetic testing and DNA evidence of the Pakistani courts, there are some significant key steps that are recommended. Firstly, the government should embrace a comprehensive law on DNA that is explicit on the collection and examination, storage and use of genetic information. Such laws and this should include privacy, consent, data banks and ethical protection to prevent any abuse or any other form of unauthorized access.

Secondly, the growth of forensic infrastructure should be extended throughout the country. It will lead to the provision of a reliable and timely DNA test by making sure that more accredited laboratories are established, so that the technological capacities and proper quality control can be enhanced. Chain-of-custody protocols should be observed to the letter in order to guarantee that evidence is not damaged.

Third, judicial and law enforcement programs should be strengthened. They also expect the judges, prosecutors and police officers to be trained to learn more about the scientific knowledge in order to be able to assess the DNA evidence accurately and integrate it more into the legal process. Fourth, the collaboration with other forensic networks and institutions of higher learning will assist in embracing the finest of practices and ensure that their laboratories, alongside emerging technologies, are accredited.

Finally, the society awareness should demonstrate the significance of DNA evidence in creating justice, building trust and making even the victims, litigants and the community in general aware of the Islamic relevance of DNA evidence. These will make the system of law in Pakistan stronger, more moral, and scientifically based.

Research Limitations

The studies of criminal justice ethics in Pakistan are limited in a number of ways. To begin with, it is difficult to have reliable and full data because of the necessity to be more transparent and report

regularly in law enforcement and court proceedings. Second, there are no comprehensive empirical studies that would analyze the problems in the context of the Pakistani setting, which restricts the level of analysis. Third, political and social sensitivities may disrupt objective research as the study results might be biased by existing prejudices or opposition of the stakeholders. In addition, the effects of cultural and religious norms on ethics also make it rather difficult to generalize the findings to other regions and communities.

Lastly, the legal and political environment in Pakistan is changing very fast, and this may soon make any research outdated; it is necessary to keep updating the research periodically. These constraints make it necessary to be careful in interpreting research results and their policy and practice consequences. Furthermore, the effect of cultural and religious standards on ethics makes it difficult to generalize the findings in other regions and societies.

Research Implications

This research study on the legal position in Pakistani courts regarding genetic testing and DNA evidence has a number of limitations. First, the empirical data are not available in large amounts since there are not many official reports or extensive statistics on the utilization, correctness and results of the DNA evidence on crimes and civil cases. The scientific methods used in many cases have not been explained in detail in the judgment of the court, and it is therefore hard to determine consistency in judicial interpretation. Second, there is a challenge of geographical and institutional differences. The concentration of forensic laboratories and trained human resources in large cities and the generalizability of results nationwide are low because of the underrepresentation of rural areas. Third, the paper is heavily based on secondary sources such as scholarly works, law and case law, which might be ineffective in reflecting the realities of courtroom practice. Lastly, ethical and privacy issues related to genetic information are dynamic, and laws at present may not be indicative of the future regulatory changes, limiting the temporal scope of the study.

Future Research Directions

The study of genetic testing and DNA evidence investigation in the future in Pakistan should consider several areas of concern. Firstly, empirical studies of the practice of the courtroom should be conducted, which will be able to establish how judges, prosecutors and defence attorneys consider and utilize DNA evidence. These research works can enlighten on the level of consistency, reliability and biases in decision making of the judges.

Second, research into forensic infrastructure and capacity to be covered, including laboratory efficiency, accreditation standards, and trained personnel at the provincial level, should be conducted. It could be applied to establish a gap and bring improvement through comparison to the international best practices. Third, legal and ethical considerations that should be addressed further are legal aspects and, in particular, privacy laws, consent laws, and the handling of genetic databases. The policies can be formulated on the basis of research conducted on the attitudes of the population towards DNA testing and values in the controversial cases.

The interdisciplinary studies that bring together law, forensic science, and information technology may bring about new solutions, such as secure digital DNA databases, automated analysis and better protection of procedures, and ultimately lead to better criminal justice in Pakistan.

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