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# Evaluating the Multiple Dimensions of DNA Evidence in India

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**Abstract**

**DNA profiling stands as one of the most significant breakthroughs in forensic science, enabling the identification of individuals even from minimal biological samples, such as a tiny tissue fragment or a drop of blood. This technique has drastically transformed the investigation of various criminal cases, including those involving rape, paternity disputes, and murder. It has also found applications in forensic odontology. Despite its power and dependability as a scientific method, the use of DNA profiling in legal contexts raises important questions regarding legal reforms. One major area of concern is the acceptance of DNA evidence in courts, which is a critical issue for legal professionals and forensic scientists globally. It is essential to approach this scientific evidence with a clear legal framework. As such, this paper aims to inform forensic experts and odontologists about the admissibility and evaluation of DNA evidence in court, with a particular focus on the Indian judicial system's laws regarding evidence admissibility. Additionally, the paper delves into the reliability, legal value, and constitutional considerations related to DNA evidence. The research for this paper includes a review of literature on DNA evidence and its admissibility, gathered from electronic databases such as Google, PubMed, and EMBASE, spanning from 1975 to August 2022.**

**Keywords: DNA, Admissibility, Reliability, Evidentiary Value, Electronic databases**

## 1. INTRODUCTION

To solve a criminal matter is a complicated mission. A lot of challenges could be faced by the investigative agency during the investigation to precisely catch the culprit and bring him to court. The evolution and usage of DNA profiling in the Criminal Justice System has been remarked asthe 'greatest breakthrough in forensic science since fingerprinting'[1]. Due to the advent of DNA evidence, lakhs of people around the world are convicted in variety of crimes and many wrongfully convicted people have been acquitted. Most of the convictions or acquittal would have been unattainable without DNA evidences.

The objective of forensic DNA Analysis is to find the source of biological proof gathered at the crime scene. Now, the Criminal Justice Systemprofoundly counts on DNA-based evidence. Considering all the forensic evidences, in order to identify the perpetrator or any individual, DNA Evidence is likely to possess the highest probative value. In Civil cases, the usage of DNA evidence is limited but not rare. Courts in their discretion sometimes allow DNA evidence and sometimes reject it. In the absence of any

[1] *Sir David J O'Dowd, "Report of her Majesty's Inspectorate of Constabulary", (2003)*

particular legislation governing DNA evidence in India, to know the current position on the DNA evidence in India becomes very pertinent.

## 2. FACTORS WHICH MAKE DNA EVIDENCE RELIABLE

In the year 1990, the OTA (Congress Office of Technology Assessment) reviewed DNA testing methods and reported that they were reliable and valid if and when performed correctly.[2] There were various reasons for the same, some of which are listed below:

- The idea behind using DNA evidence to identify is that sexually reproducing creatures are genetically unique. DNA possess very high differentiation factor. Except identical twins, no two persons can have indistinguishable DNA. Present forensic DNA genotyping mechanism permit attaining this differentiation of one in multi billions, making it certain that every DNA profile acquired is virtually distinctive.

- It is not viable to exchange DNAs of two individuals. A person's DNA profile is steady and it does not vary with the lapse of time. Some forensic evidences used for identification like fingerprint evidence could alter within the lifespan of the person but DNA does not.

- DNA is capable of surviving in tough surroundings. It can sustain both man-made and natural environmental damage. That's why from very old and rotten biological samples as well, accurate DNA report could be obtained. The presence of high molecular integrity of DNA lets the forensic scientists to examine even those samples which have gone through chemical process or which are highly tarnished by means of contemporary forensic approaches.

- Within a human body, different types of cell contain identical DNA pattern. Meaning thereby, DNA obtained from different parts of a same person will possess matching complements. Therefore, a DNA profile of a hair collected from one crime scene can be compared with a blood sample collected from other crime scene. If donor of both the samples is same, they are going to match.

- DNA is hereditary. Similar DNA profiles are shared by family members. Analyzing DNA samples of near relatives could also help in gathering evidences in criminal trials where perpetrator is a family member. In establishing paternity or maternity in civil cases, DNA evidence could be very helpful, if genetic profile of the child is found to be the composite of his/her parents.

A wide range of information could be obtained using DNA testing. The sample's source gender, eye color, skin color, ethnic belonging, inclination to specific diseases, hair color and even age could be known. The arena of DNA is only going to increase with emerging technologies and researches. About the person whose biological sample is being examined, no other type of evidence is proficient enough to produce this much information.

[2] *U.S. Office of Technology Assessment, "Genetic Witness : Forensic Uses of DNA Tests", (Washington, D.C., July, 1990)*

## 3. THE PITFALLS OF DNA TESTING

DNA testing is the most reliable and accurate method for human identification. But the forensic DNA analysis also has problems and downside likewise as any other scientific technique that can compromise the veracity of the data and eventually the strength of DNA evidence. A forensic expert need to derive two conclusions relating to the question of STR genotyping: First, whether the collected sample contains DNA of one donor orit is blend of DNAs of multiple donors? Second, whether accurate identification by genotype at each locus is there? The interpretation of the outcome is considerably affected if any flaws are there in determining the genotype information or number of donors. Mixed DNA analysis has subjective elements. Any guarantee assuring "100% accuracy" or "unique matches" is unacceptable and invalid scientifically.

There could be many reasons why two DNA profiles may match. Error during DNA profiling process could lead to wrong match. Also, there could be instances like someone other than accused touched a material thing at the crime scene after the accused. So, secondary transfer ofDNA is also probable.

It is also possible that someone who was present at the crime scene could have identical DNA profile with any of the other suspects. It is likely to happen when suspect is close relative to thereal culprit. Due to this negative inference could be drawn against the suspect.

Some other factors that could lead in reaching DNA conclusions are mentioned below[3]:

1. ***Factors associated with the donor of the biological sample:*** In some cases, genetic characteristics of the sample-holder along with early or ongoing medical treatment can set difficulties for the interpretation of DNA profiles. Genetic factors are linked with the existence of chimerism, somatic mutations and chromosomal irregularity. Non-genetic factors could result from special surgical treatments like bone marrow transplantation or blood transfusion.
2. ***Factors associated with the state of biological evidence:*** There are chances that some intensity of deterioration will be present in DNA extracted from a sample recovered from a crimeof scene that has been subjected to multiple environmental or chemical insults, or if sample marked the presence of PCR inhibitors. In such situations the only possibility may be to obtain a partial STR profile from the sample. As the strength of DNA evidence is directly proportionally affected by the number of informative alleles in a DNA profile, any missing genetic information will be reduced to the random math probability and hence the evidential value of DNA evidence.

In criminal investigations, DNA degradation usually results from natural reactions due to exposure to heat, water or other biological agents (e.g., bacteria, fungi). The tendency for case work specimens to deteriorate be contingent on the type of specimen, the length of time from the stain being deposited at the crime scene, and the nature and severity of environmental factors. Soft tissue DNA breaks down faster than bone DNA. Samples from a dry and dark environment are of better quality than samples from a humid environment. The rate of genomic DNA is faster than that of wet.

In the past few years forensic scientists have developed various possible solutions for minimizing the

[3] *Andrei Semikhodskii, "Dealing with DNA Evidence: A Legal Guide", ROUTLEDGE-CAVENDISH (2007)*

effect of DNA degradation. But, even then, chances of wrong conclusions are notout of picture.

1. ***Factors associated to DNA testing methodology:*** The appearance of extra peaks in DNA profile besides the peak for the targeted alleles creates problem. These extra peaks can arise from the issues related to the technology of detection of fluorescently labeled fragments, biochemistry of genetic analysis and poor operator technique. It is pertinent to discriminate between real and spurious peaks as failure to do so may result in false conclusions.

2. ***Contamination:*** Contamination is the unintentional mixing of forensic samples with foreign substances (biological or non-biological in nature). Different forms of contamination have different effects on DNA analysis. Contamination with non-biological materials such as household chemicals or soil can cause DNA analysis to fail, while contamination with some biological agents such as bacteria can compromise the integrity of the DNA in the sample. Much more serious from a criminal point of view is the contamination of samples with biological material of human origin. This type of contamination can degrade the probative value of DNA evidence and lead to incorrect conclusions. Therefore, errors occur during forensic DNA examination. No matter how rigid the error prevention system is, how error-free the laboratory processes are claimed, the error rate can only be minimized and not completely eliminated.

## 4. ADMISSIBILTY AND RELIABILITY OF DNA EVIDENCE

There are no precise laws in India that give investigative authorities and courts clear guidelines and the procedure to be followed in cases where DNA is used as evidence. There are some provisions in CrPC and IEA that determine the current position of DNA testing in India. Sections 53 and 54 of the CrPC implicitly cover DNA evidence and are used extensively to solve complicated criminal cases.

If the police officer has reasonable grounds to assume that the questioning of the accused serves to gather evidence in connection with the criminal offense committed, he may have the accused examined by a doctor in accordance with section 53. Section 54 allows the arrested person to be further examined by a resident doctor. at the prisoner's request.

Through Amendment Act, 2005, Section 53-A was inserted in CrPC which mandates examination of rape accused by a medical practitioner. Explanation to this Section includes within its scope of examination, semen, swabs, hair samples, finger nails, blood, blood stains and sputum by applying modern techniques in sexual offences including DNA profiling. The court also has the power to order police officers to take blood samples from the accused and perform a DNA test for further investigation under Sections 173(8) and 293(4) of the Code of Criminal Procedure.

Section 164A inserted after Amendment Act, 2005[4] provides for medical examination of the rapevictim. It expressly mentions that registered medical practitioner needs to examine rape victim and prepare a report including information about “the description of material taken from theperson of woman for DNA profiling”.

[4] *Criminal Law (Amendment) Act, 2005 (Act 25 of 2005), S. 17.*

In addition, Section 45 of the Indian Evidence Act, 1872 is of greater importance when it comes to the admissibility of DNA evidence. According to Sec. 45, the opinion of a person who has special knowledge or knowledge in science is decisive. Section 293 of the CrPC speaks of reports by certain government scientific experts. Section 293(2) gives the court the power to subpoena and question any expert on the subject matter of the report.

Many convictions have been obtained in India based on the accepted scientific evidence under Section 45 of the Indian Evidence Act. DNA testing has become a well-known element in criminal proceedings and the admissibility of test results in court has become a matter of continuity. Since India has an adversarial system, medical evidence is only admissible if the expert testifies orally in court under oath, except in special situations.

In ***Patangi Balarama Ganesh vs. State of Andhra Pradesh.***[5]**,** the court allowed the opinion of DNA expert and it was held to be admissible in evidence by the Andhra Pradesh High Court. In this case the court further observed the DNA evidence testified as under: "If the DNA fingerprint of a person matches with that of a sample, it means that the sample has come from that person only. The probability of two persons except identical twins having the same DNA fingerprint is around 1 in 30 billion world population." "It means that DNA test gives the perfect identity. It is a very advanced science".

In the case of ***Dharam Dev Yadav vs. State of Uttar Pradesh***[6]**, "***the*** Court held that DNA Profile is valid andreliable but obviously it depends on the control and quality assurance procedures in the laboratory. If all the sampling and testing are done by experts whose scientific knowledge and experience are not in doubt, then there is no reason to discard DNA evidence."

So, from the above judgment it could be inferred that reliability of DNA evidence depends on certain check-lists to be ascertained by courts using expert testimony. Also, the expert himselfmust be a reliable one. It is because once the expert opinion is relied upon by a Court the same also becomes the opinion of Court and wrong conclusions from the same could lead to travestyof justice.

In ***Madan Gopal Kakkad vs. Naval Dubey***[7]**,** the Supreme Court held:

*"A medical witness called in as an expert and the evidence given by the medical officer is really an advisory character based on the symptoms found on examination. The expert witness is expected to put before the court all materials inclusive of the data which induced him to come to the conclusion and enlighten the court on the technical aspects of the case by explaining the terms of science so that the court although not an expert, may form its own judgment on those materials after giving due regard to the expert's opinion because once the expert's opinion is accepted it is not the opinion of the medical officer but that of the court."*

Accurate and proper collection, collection, preservation and documentation must demonstrate to the court the reliability of the DNA evidence presented. This fact makes it easier for the court to allow the DNA evidence in a case before it or not.

[5] *2003 Cri LJ 4508*
[6] *Cr. Appeal No. 369 of 2006*
[7] *(1992) 3 SCC 204*

## 5. EVIDENTIARY VALUE OF DNA EVIDENCE

The term "DNA fingerprinting" could create misconceptions and it should be replaced by usage of term DNA Analysis. It is not feasible to evaluate the entire DNA arrangement of billions of compounds in the same manner like a complete fingerprint can. Only a statistical possibility of identifying a person from a range of population is portrayed by a match arrived from DNA typing. Therefore, the outcomes of DNA typing are not taken as ultimate evidence of identity. The courts, in many cases, have concluded that medical evidence is hardly conclusive because it is considered as only evidence of opinion. It cannot be considered as a substantive piece of evidence. But they trust the opinion of the doctor who did the autopsy. Until and Unless the medical report is flawed, the court cannot change its opinion about the medical report.

In ***Raghuvir Desai vs. State***[8], the Bombay High Court observed that *"DNA testing is clinchingpiece of evidence - DNA testing can make a virtually positive identification when two samples match. It exonerates innocent and helps to convict the guilty."*

So, although DNA evidence because of its accuracy and high probative value is a strong piece of evidence for proving any relevant fact, but it cannot be soul basis of conviction. It can be basis of conviction, if corroborated by other relevant and reliable evidences. Even a little doubt in the reliability of DNA evidence could lead to the inference that accused is not guilty beyond reasonable doubt.

Looking at the factors that add to reliability of DNA evidence on one hand and pitfalls on the other, in my analysis also, DNA evidence could only be corroborative in nature. It cannot be treated as substantive evidence by the courts because its reliability may vary on case to case basis. Even if DNA evidence is fully reliable in a particular case still it requires corroboration with other evidences (for example, it may prove presence of a particular person at the crime scene, but he was there before the crime was committed by actual offender).

However, a DNA non-match is the conclusive proof. It would result in direct elimination of that particular person from being a donor of any sample collected during the crime scene whose DNAsample did not match for the reason that any difference in DNA sequencing would confirm that, the DNA samples have been obtained from diverse sources.[9]

## 6. CONSTITUTIONAL VALIDITY OF DNA EVIDENCE

### 6.1 Right to Privacy and DNA Testing

Emergence of DNA Evidence has raised many questions on the issues with respect to Right to privacy. This gives reasons to the Court to reject the application requesting DNA testing of any person. But it has been held by Court on several occasions that Right to Privacy is not an absolute right and it is on this ground the Court allows DNA testing during investigation and forproducing evidence.

[8] *2007 Cri LJ 829*
[9] *National Institute of Justice, "DNA Evidence: Basics of Analyzing", available at: nij.ojp.gov: https://nij.ojp.gov/topics/articles/dna-evidence-basics-analyzing, (last visited on July 19, 2022)*

In ***Sadashiv Mallikaijun Kheradkar vs. Smt Nandini Sadashiv Kheradkar***[10], the Bombay High Court ruled that the court has the power to order the blood test, but it should not be done routinely or conduct a travel investigation. He further noted that the court can only issue an order, but not compel a blood sample to be given.

Similarly, in ***Banarsi Dass vs. Teeku Dutt***[11]**,** it was held that "DNA test is not to be directed as amatter of routine but only in deserving cases." In ***Dipanwita Roy vs. Ronobroto Roy***[12], in a case of alleged infidelity, the court upheld the opinion expressed in Banasri Dass, adding that a negative conclusion can be drawn against a party who refuses to undergo a DNA test.

After Right to privacy was held to a fundamental right within the scope of Article 21 in ***K.S Puttaswamy vs. Union of India***[13], the Supreme Court is also looking upon DNA evidence with agreater emphasis on Right to privacy angle.In ***Ashok Kumar vs. Raj Gupta***[14]**,** the Supreme Court held that compelling a reluctantparty to submit himself to DNA test is an intrusion on his personal liberty and right to privacy.

The Court further observed that: "*Keeping in mind the issue of burden of proof, it would be safe to conclude that in a case like the present, the Court's decision should be rendered only after balancing the interests of the parties, i.e, the quest for truth, and the social and cultural implications involved therein. The possibility of stigmatizing a person as a bastard, the ignominythat attaches to an adult who, in the mature years of his life is shown to be not the biological sonof his parents may not only be a heavy cross to bear but would also intrude upon his right of privacy."*

However, it is to be noticed that Right to privacy is a very major issue in civil disputes only. In civil cases voluntary and informed consent has great relevance. But even in civil cases, the court has compelled the party to give DNA sample in past. In ***Rohit Shekhar vs. Narayan Tiwari***[15]**,** the Court ordered for using reasonable force to collect the blood sample to determinethe issue of paternity.

In criminal cases, for promoting the ends of justice the DNA test is ordered, admitted and reliedupon in routine now wherever required. Advancement of DNA evidence is very common in criminal matters. But, even in criminal cases where police requests for DNA testing of any person and the Court is of the opinion that such DNA testing is not necessary at all in such particular circumstances of the case, it will reject it.

Recently, the Criminal Procedure (Identification) Act 2022 was passed in Lok Sabha. The bill is meant to succeed the Prisoner Identification Act 1920, which allowed measures to be taken to analyze and investigate criminal cases. A key feature of the bill is its expanded definition of measures to incorporate iris and retinal scans, behavioral attributes including signatures, handwriting, fingerprints, footprints, handprints, photographs, and physical and biological samples and their analysis. The words "and their analysis" in the definition of measurements mainly imply the probability of using different sources of

[10] *1995 Cri LJ 4090*
[11] *2005(4) SCC 449*
[12] *(2005) I SCC 365*
[13] *(2017) 10 SCC 1*
[14] *LL 2021 SC 525*
[15] *ILR (2010) Supp. (3) Del. 573*

information to make profiles.[16] The draft law expands the group of individuals whose data will be collected to include people convicted or imprisoned for any crime.

Importantly, the bill makes it an offence to resist or refuse the taking of measurements. The bill provides for making it non-obligatory to furnish biological samples unless the offence is against a child or woman or punishable with imprisonment of seven years or more. So, now any person arrested for any crime against woman or child punishable with more than seven years could be forced to give his DNA sample. Therefore, as soon as the person will become arrestee in such cases his right to privacy will dilute when the said bill will become an Act. In my analysis, this intrusion in right to privacy is justified because it aims to punish the offenders of crimes committed against woman and child and therefore, this collection of biological sample passes the test of proportionality noted down in much previous SC judgments.[17][18] But even this bill recognized that a person committing any offence (other than that against woman and child punishable with minimum seven years), cannot be compelled to give biological sample which could be retained for 75 years. So, right of privacy with respect to DNA evidence has been taken care of to some extent by this bill as well.

**DNA Evidence and Right against Self-Incrimination**

Right against Self-incrimination is protected by Article 20(3) of the Constitution. An accused person has right to remain silent on the facts that could result in securing his conviction. Giving DNA Evidence is self-incriminatory or not is a question faced by Court in many of the cases.

In ***State of Bombay vs. Kathi Kalu***[19]**,** it was held that only compelled testimony from personal knowledge of the accused could be violative of Article 20(3).

In ***Selvi vs. State of Karnataka***,[20] while deciding the legitimacy of DNA tests on the aspects of Article 20(3), a five-judge bench of SC made following observation, — "*The matching of DNA samples is emerging as a vital tool for linking suspects to specific criminal acts. It may also be recalled that as per the majority decision in* ***Kathi Kalu Oghad***[21]*, the use of material samples such as fingerprints for the purpose of comparison and identification does not amount to a testimonial act for the purpose of Article 20(3). Hence, the taking and retention of DNA samples which are in the nature of physical evidence does not face constitutional hurdles in the Indian context."*

Then, in ***Thogorani Alias K. Damajanti vs. State of Orissa,***[22] the Orissa High Court held that before passing a direction to conduct DNA test, the court should hit a balance between public interest and the fundamental rights guaranteed under Articles 20(3) and 21.

In balancing this interest, the following must be considered:

[16] *Paarth Nathani, "The Criminal Procedure (Identification) Bill, 2022 and the Right to Privacy", Economic and Political weekly, Vol. 57, Issue No. 16, 16 Apr, 2022*
[17] *Modern Dental College and Research Centre v State of Madhya Pradesh, (2016) 7 SCC 353.*
[18] *KS Puttaswamyv Union of India, (2017) 10 SCC 1.*
[19] *AIR 1961 SC 1808*
[20] *(2010) 7 SCC 263*
[21] *The State Of Bombay vs Kathi Kalu Oghad, AIR 1961 SC 1808*
[22] *2004 Cri LJ 4003*

"(a) the extent to which the accused may have participated in the commission of the crime;
(b) the gravity of the offence and the circumstances in which it is committed;
(c) age, physical and mental health of the accused to the extent they are known;
(d) whether there is less intrusive and practical way of collecting evidence tending to confirm ordisprove the involvement of the accused in the crime;
(e) the reason, if any, for the accused for refusing consent."

Recently, in ***Malappa vs. State of Karnataka***[23], it was held that "*If the self-incriminatory information has been given by an accused person without any threat, that will not be hit by the provisions of Clause (3) of Article 20 of Constitution of India for the reason that there has beenno compulsion*,"

The court also observed that, "*It is clear that ordering for DNA itself should not be as a matter ofroutine but wherein deserving cases, the Court can direct for DNA test and there is no prohibition for ordering DNA test and the same is subject to each facts and circumstances of the case*."

Further, the Court also ventured into Right against self-crimination with respect to DNA profiling and observed: "*Creating and maintaining DNA profiles of offenders and suspects are useful practices since newly obtained DNA samples can be readily matched with the existing profiles that are already in the possession of the law enforcement agencies. The matching of DNA samples is emerging as a vital tool for linking suspects to specific criminal acts and further held that the taking and retention of DNA samples, which are in the nature of physical evidence does not face constitutional hurdles in the Indian context"*.

Therefore, in my analysis, on the point of self-incrimination, position of DNA evidence is clear. Thus, plea of self-incrimination is rejected by Courts in majority of the cases.

However, plea of privacy can still prevent the accused from giving DNA samples, because on the point of Right of privacy in criminal cases, position is still unclear. Right to privacy and giving of DNA/material evidence aspect, after ***Puttaswamy***[24] and ***Ashok Kumar case***[25], calls for interpretation of Supreme Court or any express legislative provision in criminal matters.

## 7. CONCLUSION

DNA analysis is of paramount significance in deciding the paternity of a child in the cases of civil disputes. Otherwise, in civil cases DNA evidence is not allowed because issue of privacy isconsidered to be very sensitive and sacrosanct. In criminal cases, DNA evidences are admitted as a matter of course. DNA evidence is highly accurate, not fully accurate. Therefore, it cannot be substantive evidence for conviction but will require corroboration.

There is a range of issues with respect to DNA evidence in India on which clarity is still needed. To ensure that modern technologies can be used efficiently, special legislation is urgently needed to provide the guidelines that regulate DNA testing in India. The DNA Technology Regulation (Use and

[23] *2022 LiveLaw (Kar) 3*
[24] *(2017) 10 SCC 1*
[25] *LL 2021 SC 525*

Application) Bill 2018 regulates the use of DNA technology to establish the identity of individuals in criminal and civil matters. Thebill is yet to become a law.[26] That is a separate issue whether the bill needs to be amended or not. But, need of the hour is to at least have a law that could clarify the legal aspects on DNA evidence because law must be unambiguous. So, the bill needs to be passed. In the absence of any concrete legislation on DNA evidence, on many aspects Indian law stands at nowhere, except judicial discretion.

[26] *The Wire, DNA Technology Regulation Bill seen to Harm Minorities, Hurt Privacy, available at: https://thewire.in/government/dna-technology-regulation-bill-seen-to-harm-minorities-hurt-privacy, (last visted 01, Aug, 2022)*