
THE ROLE OF DNA IN INDIAN CRIMINAL JUSTICE SYSTEM

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ABSTRACT

Deoxyribonucleic Acid, in the last few years, has been emerging as a critical challenging tool for achieving accuracy in court. Forensic science is an important aspect of justice delivery that deals with victims of scientific advances in law. There are multiple ways that DNA can be utilized in solving crimes. To check whether an accused person is guilty or not, one can compare the DNA profiles from suspects and crime scene exhibits. Examples of this include; hair, blood, saliva, sperm, bones, skin and cheek cells for taking samples of deoxyribonucleic acid. These kinds of proof support criminal investigations and help create a connection between the offenders and the crime. Therefore, DNA evidence is essential for defending victim rights and resolving serious crimes like rape, sexual assault, and murder. In addition, DNA testing is used to settle civil cases involving immigration, parentage, and the fraudulent sale of plant and animal products. The aim of this paper is to give readers knowledge about DNA evidence, its importance in the administration of justice and how it can be presented before a court. This essay focuses on examining how DNA evidence is employed in the Indian criminal justice system, how it has changed over time and whether it can be legally used under different legislations. The study also intends to ascertain whether criminal laws should be created or amended to incorporate DNA evidence and whether a DNA database is required to guarantee the prompt identification of offenders.

Keywords: DNA Evidence, Forensic Science, DNA Legislation

INTRODUCTION

Science has provided numerous new tools for the analysis of forensic evidence, one of which is the potent and controversial study of DNA, the material that comprises the biological code of most creatures. Deoxyribonucleic acid (abbreviated DNA) is the molecule that carries genetic information for the development and functioning of an organism. DNA is made of two linked strands that wind around each other to resemble a twisted ladder — a shape known as a double helix. Each strand has a backbone made of alternating sugar (deoxyribose) and phosphate groups. Attached to each sugar is one of four bases: adenine (A), cytosine (C), guanine (G) or thymine (T)¹. Traditional types of evidence gathered from the crime scene or produced in court were previously the only sorts of evidence that courts used. When more research reveals a connection between these pieces of evidence and the accused, they are found guilty. This approach has worked well in the majority of circumstances. Even if in some situations the accused's evasion works against him or her, this has sometimes resulted in the conviction of innocent people, and insufficient proof has even led to the release of a number of accused individuals. Therefore, it is imperative to have an effective system in place to guarantee that the real criminals face consequences for the crimes they committed and to safeguard society from harm. Additionally, this might aid in the exoneration of innocent people who were falsely convicted of the crime. Forensic evidence is crucial in these kinds of situations. These evidences are frequently very accurate and aid in identifying the offenders based on their own evidence. Humans possess a special biological blueprint called deoxyribonucleic acid, or DNA.

DNA is gathered from any cell, hair strands, blood, tissues, semen, or bodily fluids that the criminals unwittingly left behind at the crime sites in criminal investigations. This technique is known as DNA profiling, and it allows for the identification of the offenders.

Origin of DNA Testing

In a lab in the Department of Genetics at the University of Leicester, England, Sir Alec Jeffreys, a British geneticist, discovered in 1984 how to use DNA testing to obtain a genetic "fingerprint." When Jeffreys saw the X-ray film image of a DNA experiment that unexpectedly revealed both similarities and differences in the DNA of various members of his technician's

¹ <https://www.genome.gov/genetics-glossary/Deoxyribonucleic-Acid>

family, he claims to have experienced a "eureka moment" in his lab. Within half an hour, he became aware of the potential applications of DNA fingerprinting, an identification method based on genetic code variances. When Jeffreys was asked to assist in a contentious immigration case in 1985 to verify the family identity of a British kid whose family was originally from Ghana, the DNA approach was first used. A Ghanaian family moved to the UK and obtained British citizenship. Nevertheless, one of the boys returned to Ghana and was prevented from entering the UK due to the presence of a fake passport. Inquiring if Jeffreys could verify that the boy was, in fact, the mother's son and not her nephew, the family's attorney got in touch with him. DNA samples were obtained from the mother, her three uncontested children, and her son, whose identity was under investigation. The relationship between the mother and the son in question was verified by the DNA patterns. Furthermore, the examination verified that the father of all four children was the same. When the mother received the results, Sir Jeffreys claimed to have seen relief on her face.

In 1986, a police forensic test used DNA fingerprinting for the first time. In Narborough, Leicestershire, two teens had been sexually assaulted and killed, in 1983 and 1986, respectively. Despite the fact that the attacks happened three years apart, the authorities concluded that the same individual was behind both of them due to similarities. Richard Buckland, a detained suspect, admitted to the most recent murder but not the previous one. Jeffreys was requested to perform DNA profiling on tissue samples, semen, and blood samples taken from the two victims as well as the suspect.

Comprehending DNA Evidence

Over the years, DNA evidence has shown to be quite important in criminal investigations. Any bodily cell that is inadvertently left behind at the crime scene can be used to gather it. Following an inspection, forensic specialists must look over and gather evidence, separate DNA, and perform DNA profiling analysis in order to determine who committed the crime. These highly accurate proofs can be utilized to establish an accused person's guilt or innocence in cases when condemned parties are later found not guilty. The primary purpose of DNA evidence is to identify convicted individuals in cases of sexual assault or murder. Semen samples taken from the victim's body in situations of sexual assault or rape can be analysed and compared with those of the accused to ascertain whether or not they were the ones who perpetrated the crime. By using mutilated portions, it can also be utilized to identify victims or accused parties. It is

also possible to determine a child's maternity or paternity using DNA evidence. As previously said, a person's DNA is their distinct composition, which they receive from their parents. It can therefore be utilized to illustrate the relationship between a parent and child.

Criminals who have committed crimes can be generally identified by DNA evidence. These evidences can also be utilized to establish whether the accused individual committed the crime or participated in its commission. A sample taken from the crime site and another sample from the accused are compared during the process. For immigration purposes, DNA evidence is also utilized to prove family relationships and demonstrate the tie between the beneficiary and the sponsor.

Types of DNA Evidence Analysis

- i. **Polymerase Chain Reaction (PCR):** The evolution of DNA testing advanced significantly when Dr. Kary Mullis discovered that DNA could be copied in the laboratory much as it is in the natural world. The copying process, known as polymerase chain reaction (PCR), uses an enzyme (polymerase) to replicate DNA regions in a test tube. By repeating the copying process, a small number of DNA molecules can be reliably increased up to billions within several hours.
- ii. **Short Tandem Repeat (STR) Analysis:** Short tandem repeat (STR) technology is a forensic analysis that evaluates specific regions (loci) that are found on nuclear DNA. The variable (polymorphic) nature of the STR regions that are analysed for forensic testing intensifies the discrimination between one DNA profile and another. For example, the likelihood that any two individuals (except identical twins) will have the same 13-loci DNA profile can be as high as 1 in 1 billion or greater.
- iii. **Y Chromosome Analysis:** Several genetic markers have been identified on the Y chromosome that can be used in forensic applications. Y-chromosome markers target only the male fraction of a biological sample. Therefore, this technique can be very valuable if the laboratory detects complex mixtures (multiple male contributors) within a biological evidence sample. Because the Y chromosome is transmitted directly from a father to all of his sons, it can also be used to trace family relationships among males. Advancements in Y-chromosome testing may eventually eliminate the need for laboratories to extract and

separate semen and vaginal cells (for example, from a vaginal swab of a rape kit) prior to analysis.

- iv. **Mitochondrial Analysis:** Mitochondrial DNA (mtDNA) analysis allows forensic laboratories to develop DNA profiles from evidence that may not be suitable for RFLP or STR analysis. While RFLP and PCR techniques analyse DNA extracted from the nucleus of a cell, mtDNA technology analyses DNA found in a different part of the cell, the mitochondrion. Old remains and evidence lacking nucleated cells — such as hair shafts, bones, and teeth — that are unamenable to STR and RFLP testing may yield results if mtDNA analysis is performed. For this reason, mtDNA testing can be very valuable to the investigation of an unsolved case. For example, a cold case log may show that biological evidence in the form of blood, semen, and hair was collected in a particular case, but that all were improperly stored for a long period of time.²

TECHNOLOGY USED IN DETERMINING DNA

- i. **DNA Technology in Forensics:** DNA is unique. Because it is unique, the ability to examine DNA found at a crime scene is a very useful forensic tool. The common methods used to identify and describe the DNA profile includes - Restriction fragment length polymorphism (RFLP) and Short tandem repeat profiling (STR). In RFLP, the DNA is cut into segments of varying lengths by an enzyme, then the segments are separated out on the basis of size using a technique called electrophoresis. Electrophoresis is essentially applying positive and negative currents to a gel base and letting the DNA migrate to the positive pole (since it is negatively charged). The labelled fragments separate out based on their size. This gives a picture of which of the labelled fragments. Short tandem repeat profiling (STR) involves use of an enzyme to make many copies of a small section of the DNA. This section is then cut into pieces by another enzyme, and separated by electrophoresis. The fragments are then visualised with a silver stain, with the pattern of light and dark bands seen being characteristic for an individual.
- ii. **DNA in Bioinformatics:** Over the last decades there has been rapid progress in the human genome project and biotechnologies. These advances result in many complex datasets associated with in depth knowledge, e.g., genome sequences of many species, microarray

² <https://nij.ojp.gov/topics/articles/dna-evidence-basics-analyzing>

expression profiles of different cell lines, single nucleotide polymorphisms (SNPs) or mutations in the human genome, etc. This has given birth to a new field of Bioinformatics and has vast utility in the pharmaceutical industry. The two exciting techniques that have come up include the genome sequencing technology and the DNA chip technology. It is estimated that the human genome has about 30,000 genes, which, surprisingly, only account for ~3% of the genome. The expression of these genes, i.e., the amount of protein products to be made in a cell, is tightly regulated so as to meet the requirements of specific cells and for cells to respond to changes in their environment. A central goal of molecular biology is to understand the regulation of protein synthesis. DNA contains a vast amount of non-coding and non-functional sequences. These remain switched off and contain mutated genes or those inserted from other organisms, e.g., viruses and bacteria. Much of these DNA that were not coding for any proteins were till date termed “junk DNA”. Now, in a series of papers published in September in Nature (Scientific American is part of Nature Publishing Group) and elsewhere, the ENCODE group have found that there may be signals and switches present in this junk DNA. This has paved ways to discover human disease over ages.

- iii. **DNA in Pharmacology and Nanotechnology:** Three dimensional nanostructures can hold and release drugs and regulate protein-folding. These have a definite potential in gene therapy. Gene therapy involves using tiny molecules that carry the corrective enzyme or medication to the exact defective gene and identify and correct it. DNA Nanotubes can be used in gene therapy. Usually, viral DNA is used as the vehicle that goes and gets introduced into a foreign gene. This is called transfection.
- iv. **DNA in archaeology and anthropometry:** The analysis of DNA extracted from archaeological specimens can be used to address anthropological questions. This helps in tracking DNA evolution, migratory patterns and species evolution over the ages.³

Standards and Procedures Used

Several basic steps are performed during DNA testing regardless of the type of test being done. The general procedure includes:

³ <https://www.news-medical.net/life-sciences/DNA-and-Technology.aspx>

- 1) The isolation of the DNA from an evidence sample containing DNA of unknown origin, and generally at a later time, the isolation of DNA from a sample (e.g., blood) from a known individual.
- 2) The processing of the DNA so that test results may be obtained.
- 3) The determination of the DNA test results (or types), from specific regions of the DNA.
- 4) The comparison and interpretation of the test results from the unknown and know samples to determine whether the known individual is not the source of the DNA or is included as a possible source of the DNA.

INFLUENCE OF DNA EVIDENCE ON THE CRIMINAL JUSTICE SYSTEM IN INDIA

DNA Testing in Judicial Proceeding

The use of DNA profiling in India's criminal justice system has significantly changed the system by providing a powerful tool for identifying offenders and clearing innocent people. DNA evidence has become increasingly accepted as admissible in Indian courts since its successful use in a paternity case in Thalassery, Kerala in the 1990s. Though DNA profiling has been shown to be successful, the Indian judiciary has made inconsistent rulings about its validity due to the lack of defined regulations. Introduced in 2019, the DNA Technology (Use and Application) Regulation Bill aims to establish a legal framework that balances the protection of individual privacy rights with the pursuit of justice for the collection, storage, and use of DNA profiles.

Individual differences exist in the structure of DNA. As a result, every person is distinct from one another. Relationships can exist between parents, siblings, sisters, sons, daughters, uncles, and aunts. The following categories of forensic issues are greatly assisted by DNA profiling:

- i. Connections between the perpetrator and the victim, the weapon of the crime, the vehicle used in the crime, the scene, the routes, etc., through the exchange or deposit of body parts used as hints.
- ii. Identification of the perpetrator or the affected party using bodily parts, such as hairs

that have fallen or been taken out.

- iii. In cases of rape, the culprit can be identified using semen, semen stains, or vaginal swabs.
- iv. Saliva left in cups, glasses, cigarette stubs, spittle, biting flesh, etc. might be used to identify the guilty party.
- v. Identification of individuals via faces or urine.
- vi. Identification of disfigured deceased bodies using readily available and known body parts.
- vii. Identification of body parts is crucial when a body is strewn or severed.
- viii. Determining the true parentage in cases of contested paternity.
- ix. Incest cases.
- x. Parentage of abandoned child.
- xi. In order to recognize take encounters.
- xii. Illegal attempts to induct people from non-permitted relationships are occasionally made in immigration disputes by making false claims that they are permitted relatives. A person's DNA can determine their lineage.
- xiii. The perpetrator of a robbery or burglary is likely to leave bodily remnants like blood, semen, hair, saliva, and even faces. The DNA profile of the offender can be obtained from these sources.
- xiv. To identify those who steal protected wildlife by leaving bloodstains on their bodies that can be connected to the animal's remains.
- xv. When it comes to crimes such as rapes and murders, if the perpetrator is a "serial rapist or murderer," the connection helps identify the offender by providing information about their background and method of operation.

- xvi. Alleged adultery cases.
- xvii. False charges relating to rape, fatherhood etc.
- xviii. In instances of familial paedophilia, where proving the guilt of the offending family member can be challenging, the victim child's body material DNA can offer definite proof.
- xix. Case of gang rape to identify all of the perpetrators.
- xx. Parentage of murdered infant.

Judicial Interpretation of DNA in India

The most recent position in India is that, although DNA testing gained legal validity in 1989, there is now no explicit rule on the subject of DNA evidence. In India, *Kunhiraman v. Manoj*⁴, was the first paternity dispute which required the DNA evidence. The courts are taking DNA evidence as an expert's opinion like forensic experts, ballistic expert, biological expert, chemical expert; document writing expert, lie detector, and expert serological expert toxicological expert etc. The Indian Parliamentary Affairs Board established an advisory committee to provide a thorough report on all facets of DNA testing, and the Government of India and the Law Commission have also become aware of the issue. In its 185th report, the Law Commission also suggested that section 112. of the Indian Evidence Act be amended to include DNA testing.

The 185th Report of the Law Commission of India states that law of evidence is likely to undergo radical changes with standardization of new technologies. The judge would find himself (or herself) in a difficult situation if he/she is unable to appreciate the probative value of new standards and concepts of evidence. In modern world the technology of DNA fingerprinting has been accepted method of proving the paternity and other disputes of similar nature. The modern technologies of genetics and reproduction are solving many complicated questions of fact. With the invention of new technologies and due to new researches in the field of science, radical changes are taking place in 21st century in understanding human behaviour. These changes are not due to social sciences but due to advancement of biological science. The

⁴ II [(1991) DMC 499]

DNA fingerprinting is such a revolutionary step in the related field. Law is primarily concerned with the human behaviour and its study.

The Code of Criminal Procedure (Amendment) Act, 2005 was approved by the Indian Parliament and became Act No. 25 of 2005 after the President of India signed it on June 23, 2005. It appears that the Indian government is considering the validity, authenticity, and accuracy of DNA profiling quickly. Section 53(2) has been amended by the addition of certain requirements. It has to do with a doctor's examination of the accused at a police officer's request. A medical professional may examine the accused person(s)' blood, semen, saliva, etc.

In the case of *Mukesh and Others v. State (NCT of Delhi) and Others*⁵, the Supreme Court highlighted the growing significance of DNA evidence in India's legal system. The reliability of DNA evidence was emphasised, along with the importance of using it thoroughly in court cases. The Court declared that DNA reports should be considered highly significant and reliable, and that, unless there are strong grounds to doubt their veracity, such evidence should be regarded as final. More precisely, the Court declared that in order to dismiss a DNA result, it must be clearly proven that the report is defective because of a deficiency in the quality control or assurance during the testing procedure. This declaration signifies a crucial advancement in strengthening the probative significance of DNA in the legal system, promoting the adoption of scientifically rigorous techniques to uphold fairness in the administration of justice.

ADMISSIBILITY OF DNA EVIDENCE

In the Indian legal system, DNA tests are considered conclusive evidence. Due to its accuracy and effectiveness, DNA testing has been highly upheld in cases involving serious or grave offences like rape, murder, etc.

Recently, the **DNA Regulation bill 2019** has been introduced which is trying to establish a uniform framework for the utilization of DNA as scientific evidence. The bill clearly states that getting the person's written consent is required before taking any samples from him, but it further states that this requirement will be waived in situations where the offence carries a sentence of at least seven years in prison.

⁵ (2017) 6 SCC 1

Additionally, the bill has defined the categories of crimes and proceedings that would permit the hon'ble courts to admit DNA testing evidence. The bill has not yet taken effect, though, as the parliament is still debating it.

Under the Indian Evidence Act, 1872

Section 112 of Indian Evidence Act, 1872: DNA test admissibility in legal proceedings has long been a contentious matter that requires clarification. DNA testing is typically associated with cases where the father's paternity or the child's legitimacy is questioned. Such scenarios directly pertain to Section 112 of the Indian Evidence Act which deals with the presumption of paternity and, thus, this particular line of inquiry.

This section strongly presumes the legal validity of the child that was born in continuance of a valid marriage and the paternity of the father or within 280 days of the dissolution of the marriage. The only exception provided under this rule of presumption is if the father or the man can prove before the court that he has no access to the mother at the time when the child was begotten.

However, the advancement of scientific temperaments and technologies over the past few decades has interfered with the applicability of this section. The impact of this section has been somewhat mitigated by the advent of DNA testing, which offers an almost exact method of establishing the paternity of any individual with regard to any child whose legitimacy is in doubt.

Furthermore, in the case of *Amarjit Kaur v. Harbhajan Singh and Anr.*⁶, the hon'ble court observed that at the time when Section 112 was brought to action, there was no such concept of DNA technology. It further held that although the accuracy of DNA test i.e. 99.9 % is totally genuine it still lacks in discarding the strong presumption of paternity as provided under section 112 of the Evidence act.

Hence, initially, the DNA test was not recognized as a strong recourse to counter the presumption of paternity under section 112. The test was allowed only in cases having some strong prima facie evidence of 'non-access' at the first instance.

⁶ (2003 (10) SCC 228)

Section 45 of Indian Evidence Act, 1872: Section 45 deals with expert evidence which can be relied upon to identify and determine evidences requiring professional expertise.

When the Indian Evidence Act was passed in 1872, DNA technology was not yet established. However, DNA technology is also a branch of science. Therefore, the evidence pertaining to DNA is the opinion of experts. In *Baso Prasad VS state of Bihar*⁷, It has been observed by Hon'ble Supreme Court that the court may take expert opinion into consideration but appreciation of evidence is court's job.

In *Bhagwan Das & Anr. vs. State of Rajasthan*,⁸ it has been held that it would be a dangerous doctrine to lay down that the report of an expert witness could be brushed aside by making reference to some text on that subject without such text being put to the expert. This is precisely the error in which the trial court has fallen.

Under Code of Criminal Procedure, 1973

Tests or techniques for DNA profiling have shown to be useful in various cases like sexual assault, murder, etc. Therefore,

There are some legal provisions incorporated in the statutes in respect to this. For instance, the Amendment Act of 2005 had added two new sections, Section 53A and Section 164A to the Code of Criminal Procedure, 1973 (Cr.P.C), which were specifically meant to regulate DNA profiling especially in rape cases.

Section 53A Cr.P.C: It is required under this part that a medical examination of the accused person must be done by a doctor registered under any law for the time being in force. It also mandates samples of DNA be obtained from such an individual, and used as evidence in instances involving rape. This section underscores the significance of DNA in commissions like these. In the case of *Krishana Kumar Malik vs State of Haryana*⁹, it was held that, after the incorporation of sec 53 (A) in Cr.P.C., it has become necessary for the prosecution to go in the DNA test in such type of cases, facilitating the prosecution to prove its case against the accused.

⁷ 2007 AIR SCW 807

⁸ AIR 1957 SC 589

⁹ (2011) 7 SCC 130

Section 164A of Cr.P.C: This part deals with the medical examination of the victim. It states that it is a must for the victim to agree to be examined; otherwise, such consent has to come from someone who is allowed by the law to do so on behalf of the patient. This guarantees that in acquiring medical evidence like DNA evidence, the dignity and rights of victims are always paramount.

*Selvi vs. State of Karnataka*¹⁰ case was about several techniques including DNA profiling used within criminal investigation context as per Supreme Court. The court also clarified that under amended explanations to Sections 53, 53A and 54 of Code of Criminal Procedure (CrPC), DNA profiling is expressly recognized. It distinguished between “DNA samples” extracted from bodily substances and “DNA profiles” which are records created based on such samples and used by forensic experts. The court emphasized the utility of maintaining DNA profiles for linking suspects to specific criminal acts efficiently.

Furthermore, the court highlighted the distinction between physical privacy and privacy of mental processes in the context of investigative techniques. It asserted that while police powers may allow physical restraints such as the extraction of bodily substances for medical examination, these powers cannot extend to the forcible extraction of testimonial responses. The court underscored the importance of respecting the right to privacy, particularly in safeguarding mental privacy against invasive investigative methods.

As a result, DNA evidence is essential to India's criminal justice system, and new technological developments could help to further develop an ideal system.

LIMITATIONS OF DNA PROOFS

Inaccuracy in Forensic Data Analysis

Due to its perceived reliability, forensic DNA testing has been accepted by the public and legal profession equally, despite being heavily marketed as an unfailing means of finding the truth in criminal cases. However, recent scrutiny reveals several issues that challenge this characterization.

¹⁰ AIR 2010 SC 1974

- i. **Incompleteness and Partial Profiles:** DNA testing can yield incomplete or partial profiles due to limited DNA quantities, sample degradation, or inhibitors. Partial profiles, containing fewer genetic markers, increase the likelihood of coincidental matches, thus raising the probability of erroneous identifications.
- ii. **Mixtures and Interpretation Challenges:** Samples often contain DNA from multiple contributors, complicating the analysis. Mixed DNA profiles can be matched to multiple possible contributors, heightening the risk of mistakenly including non-contributors in the list of suspects.
- iii. **Cross-Contamination:** False matches may result from laboratory cross-contamination, in which DNA from one sample accidentally contaminates another. This problem has also led to false "cold hits," in which someone innocent is falsely accused.
- iv. **Mislabelling of Samples:** Errors in sample labelling can mislead test results. While re-testing from original sources could detect such errors, this option is frequently unavailable due to sample destruction or exhaustion, and routine duplicate testing is not commonly practiced.
- v. **Misinterpretation of Results:** Mistyping or incorrect assignment of STR profiles to evidentiary samples can result in false incriminations, particularly when profiles are compared against extensive databases.

The Supreme Court of India raised serious questions about the reliability of DNA evidence in the *Manoj v. State of Madhya Pradesh*¹¹ case, particularly regarding the possibility of contamination. The Court concluded that there could be significant doubts about the accuracy and reliability of the evidence because the DNA analysis did not include a random occurrence ratio. This ratio is significant because it provides a statistical indicator of the probability of coming across a particular DNA profile in the population as a whole. If we do not consider the "random match probability," which quantifies the likelihood that a DNA profile will coincidentally match someone other than the suspect, the validity of the DNA evidence is compromised. The Court underlined how important it is to incorporate this statistical probability in order to create a solid and reliable scientific basis for DNA matches. This

¹¹ 2022 SCC Online SC 677

guarantees that the evidence will hold up to inspection and provide a solid foundation for court decisions.

Legal Implications and Challenges of DNA Analysis

Examining DNA evidence raises a number of questions, one of which is whether or not accused parties may be pressured into providing samples for DNA testing in violation of their rights to privacy under Article 21 and their prohibition against self-incrimination under Article 20(3). These Articles are part of a person's fundamental rights, and those who are accused can also use them.

Right to Privacy (Article 21): The right to life and personal liberty is guaranteed under Article 21 of the Constitution of India. This right is not absolute, as was established by the Supreme Court in *Menaka Gandhi v. Union of India*¹²; it may be curtailed by a valid law or through the procedure that is just, reasonable, and established by law. In the *N.D. Tiwari case*¹³, the accused objected on privacy grounds, but the Supreme Court ordered a DNA test to settle a paternity dispute. The Court made sure the findings remained private and were only applied in court.

Right Against Self-Incrimination (Article 20(3)): This provision bars self-incrimination, thereby protecting individuals from giving evidence against themselves. In the case of *Ram Lal Bhogilal Shah v. V.K. Guha*¹⁴, the Supreme Court ruled that while Article 20(3) protects an individual from being forced to testify against themselves, a DNA test may still be conducted with the approval and oversight of the Court. In *State of Bombay v. Khathikalu Oghad*¹⁵, it was held that providing samples or conducting medical examination does not fall within the purview of being a witness against oneself. This was further discussed in *Selvi v. State of Karnataka*, where the court determined that DNA testing does not violate Article 20(3) of the constitution because it can be used as a crucial tool to connect accused individuals to the crimes they are accused of.

In *Thogorani Alias K. Damayanti v. State of Orissa*¹⁶, the Orissa High Court stressed that the court must weigh the public interest and the accused's constitutional rights before directing

¹² (1978) 1 SCC 248

¹³ N.D. Tiwari vs Rohit Shekhar FAO (OS) No. 547/2011.

¹⁴ 1973 SCC (1) 696.

¹⁵ AIR 1961 SUPREME COURT 1808

¹⁶ 2004 CRI. L. J. 4003

DNA testing. It is necessary to take into account elements like the seriousness of the crime, the accused's involvement, and the availability of additional evidence.

Therefore, DNA evidence has a higher evidentiary value than the fundamental rights guaranteed to the accused by the constitution because the criminal justice system is crucial to ensuring that those found guilty are punished, those found innocent are freed, and those who are impacted by injustice receive justice.

CONCLUSION AND SUGGESTIONS

DNA evidence is recognized as a highly accurate forensic tool in the Indian criminal justice system, which can be used to identify criminals and clear innocent people. The Criminal Procedure Code, Indian Evidence Act and judicial pronouncements by the Supreme Court and high courts all support its admissibility. However, despite being strong DNA evidence, it is not foolproof, and it should always be treated as expert witness testimony that cannot stand alone as conclusive.

To make it effective, it is necessary for forensic specialists who are trained and experienced to gather, store and process DNA evidence. In India, there are currently numerous forensic labs that comprise of experienced personnel not qualified enough to handle this job which can lead to errors and delays in the process. Prior to admitting DNA evidence, the court must confirm the qualifications of scientific experts. The integration of DNA evidence with other traditional forms of evidence is crucial for a comprehensive understanding of criminal cases. Additionally, legislative amendments to the Criminal Procedure Code and the Indian Evidence Act are necessary to incorporate technological advancements in forensic science and to establish a more effective criminal justice system. The establishment of DNA banks and development of comprehensive legislation for DNA evidence collection and management are also essential.

DNA evidence must be interpreted in conjunction with other case evidence and presented by specialized witnesses to avoid unfair prejudice. While statistical probabilities related to DNA profiles can be presented, they must be accompanied by clear explanations of the underlying calculations.

Despite the value of DNA evidence, it has limitations, including potential for error and the need for careful handling. It is not a panacea for all criminal justice issues. In sexual offenses, for

instance, DNA can confirm intercourse but cannot alone determine consent. There is a need for a legislative framework to regulate DNA evidence and address privacy concerns. A bill related to DNA profiling is currently pending before Parliament due to recommendations from a standing committee. It could make procedures less intricate and address privacy issues after implementation, thus enhancing the application of DNA evidence in court.

In conclusion, even though essential for modern criminal investigations, DNA evidence must be used with care in combination with other forms of proof to minimize wrongful convictions and ensure justice.