EXPLORING THE ROLE OF DNA TECHNOLOGY IN ADMINISTRATION OF JUSTICE IN INDIA: A COMPARATIVE ANALYSIS WITH USA

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ABSTRACT

Introduction: There is an increasing prevalence of novel crimes employing advanced methods and technology which necessitates investigative agencies to employ meticulous and systematic approaches grounded in scientific nature to effectively address the situation. DNA fingerprinting is one such contemporary investigative technique which assumes a significant function within the field of forensic science. DNA Technology can be utilized to identify offenders with exceptional accuracy while absolving innocents.

Objective: Despite the extensive use of DNA technology in administration of justice, there is no specific legislation for its use and regulation in India. This article aims to find out the significance of DNA technology in administration of justice in India and the challenges associated with it. It also tries to find gaps in the existing literature related to the use of DNA technology.

Method: The research methodology adopted here is normative juridical which includes comprehensive analysis of legislative framework along with the Constitutional provisions. It has also referred to a variety of scholarly literature and landmark judicial decisions.

Results: This article suggests that although DNA technology plays a significant role in the administration of justice, there are numerous challenges in relation to the use of DNA technology such as absence of a comprehensive law on the subject, privacy concerns of individuals, lack of well-equipped labs and shortage of staff, absence of database, misuse of sensitive data, mishandling of samples, etc. This all can be addressed by bringing a law and maintaining a database for which inspiration may be sought from countries like the USA.

Conclusion: In the light of changing dynamics of criminal investigation and the sophistication adopted by criminals, it is necessary that agencies effectively utilize DNA technology for speedy justice. For regulating the use of such technology along with balancing the rights of individuals, India must enact a legislation at the earliest. It is necessary because the judicious use of DNA

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technology may change the face of the criminal justice system as it is capable of providing accurate evidence.

**Keywords:** DNA technology, DNA technology (use and application) regulation bill, administration of justice, forensic evidence.

**RESUMO**

**Introdução:** Existe uma prevalência crescente de novos crimes que utilizam métodos e tecnologias avançados, o que exige que as agências de investigação empreguem abordagens meticulosas e sistemáticas, baseadas na natureza científica, para abordar eficazmente a situação. A impressão digital do DNA é uma técnica de investigação contemporânea que assume uma função significativa no campo da ciência forense. A tecnologia de DNA pode ser utilizada para identificar os infratores com precisão excepcional, absolvendo inocentes.

**Objetivo:** Apesar do uso extensivo da tecnologia de DNA na administração da justiça, não há legislação específica para seu uso e regulação na Índia. Este artigo visa descobrir a importância da tecnologia de DNA na administração da justiça na Índia e os desafios associados a ela. Também tenta encontrar lacunas na literatura existente relacionadas ao uso da tecnologia de DNA.

**Método:** A metodologia de pesquisa adotada aqui é jurídica normativa que inclui análise abrangente do quadro legislativo juntamente com as disposições constitucionais. Também se referiu a uma variedade de literatura acadêmica e decisões judiciais históricas.

**Resultados:** Este artigo sugere que, embora a tecnologia de DNA desempenhe um papel significativo na administração da justiça, há inúmeros desafios em relação ao uso da tecnologia de DNA, como a ausência de uma lei abrangente sobre o assunto, preocupações com a privacidade dos indivíduos, falta de laboratórios bem equipados e escassez de pessoal, ausência de banco de dados, uso indevido de dados sensíveis, má manipulação de amostras, etc. Tudo isso pode ser resolvido trazendo uma lei e mantendo uma base de dados para a qual se pode buscar inspiração de países como os EUA.

**Conclusão:** À luz da dinâmica em mudança da investigação criminal e da sofisticação adotada pelos criminosos, é necessário que as agências utilizem efetivamente a tecnologia do DNA para uma justiça rápida. Para regular o uso dessa tecnologia e equilibrar os direitos dos indivíduos, a Índia deve promulgar uma legislação o mais cedo possível. É necessária porque a utilização judiciosa da tecnologia do ADN pode alterar a face do sistema de justiça penal, uma vez que é capaz de fornecer provas exatas.

**Palavras-chave:** tecnologia de DNA, tecnologia de DNA (uso e aplicação) projeto de lei de regulamentação, administração da justiça, evidências forenses.
1 INTRODUCTION

The recent trend in India shows an increase in demand for DNA tests in criminal cases. As per DNA Forensics Laboratory Private Limited (centre accredited with the National Accreditation Board for Testing and Calibration Laboratories), around 300-400 samples, consisting of both private requests and court-mandated orders, are tested by it every month. This rise in demand is the result of contemporary criminals increasingly employing advanced methods and exhibiting heightened levels of organization. Investigative agencies are also employing meticulous and systematic approaches grounded in scientific principles to effectively address situations of this nature. DNA profiling is one such contemporary investigative technique that has developed in recent times. Prior to the 1980s, DNA was only employed for scientific purposes. But today, it assumes a significant function within the field of forensic science. Forensic science is a scientific discipline that operates within the confines of legal boundaries, encompassing the provision of precise information pertaining to many facets of criminal identification as well as recommendations for civil and criminal investigations. The field of forensic science has emerged as a significant contributor and essential component within the realm of criminal justice, mostly because of the advancements in DNA technology.

Deoxyribonucleic Acid (DNA) serves as the fundamental blueprint that encodes the genetic information of an individual. The genetic material within cells, commonly known as DNA, is composed of distinct molecular components that vary among individuals. This represents the exclusive means of differentiating individuals, with the exception of those who are genetically indistinguishable twins. The application of breakthroughs in the science of biology enables the accurate identification of criminals when biological evidence is acquired at a crime scene. DNA technology plays a key role in upholding fairness within the criminal justice system. This technique has the potential to be utilized for the identification of individuals who have been convicted of sexual assault, murder, cases involving child paternity and maternity, instances involving mutilated remains, general criminal identification, as well as immigration-related matters.

Within the framework of the Indian judicial system, DNA evidence holds admissibility as a type of circumstantial evidence. The admissibility of evidence is contingent upon the prosecution’s ability to demonstrate to the court an unbroken chain of custody for the physical sample, from the moment of seizure to the moment of analysis. This can only be achieved if the evidence is collected, stored, and documented accurately
and appropriately. DNA testing has a good chance of accurately identifying the perpetrator and differentiating him from innocent people. The gradual advancement of DNA analysis for forensic purposes has expanded the range of biological evidence. The source of DNA is not limited to semen and blood but has now expanded to include saliva, teeth, bones, hair and even fossils. The expanding scope of DNA testing is encountering challenges in its utilization, primarily attributed to issues such as inadequate law enforcement resources, insufficient financing resulting in laboratory shortages, and the substantial amount of uncollected and unanalyzed potential DNA evidence. Other than this, legal challenges such as violation of personal liberty, right to privacy, and right against self-incrimination are also involved. Since the significance of DNA testing and forensic evidence in justice administration cannot be denied, it becomes relevant to find the balance between the adoption of such technology and the rights of individuals. It can effectively be achieved through comprehensive legislation. This research explores these aspects associated with DNA technology.

Further, the present article has suggested that inclusion of forensic DNA phenotyping must be discussed and thereby incorporated in the 2019 Bill. It will assist in identification of the offender’s physical characteristics which may aid in future investigations as well as referred to the latest cases and analyzed the current position which was not there in the existing literature. This article also deals with the legal framework existing in USA for regulation of use of DNA technology in criminal investigation and justice administration and then makes a comparative analysis with India to suggest the changes and developments required in India.

2 THEORETICAL FRAMEWORK

The use of DNA technology in criminal investigation is increasing because of the new and advanced methods being employed by the criminals. With the free flow of information, criminals have become more sophisticated to commit crimes without leaving any traces be it in the physical world or in the virtual world. This changing situation demands adoption of techniques grounded in scientific principles. In today’s time, DNA forms a significant part of forensic science which is an important element in the criminal justice system. DNA contains the genetic information of an individual which facilitates narrowing down the perpetrator in offences like murder, rape, immigration related matters, and often in ascertaining paternity/maternity matters.
The Indian judicial system accepts these DNA evidence as a type of circumstantial evidence. Since circumstantial evidence requires an unbroken chain of custody for the physical sample, it is crucial that the sample is collected, stored, and documented properly. The domain of DNA testing is expanding which is why the limitations are coming into light. These limitations pertain to shortage of labs and staff, insufficient funding, inadequate law enforcement agencies, and so on. The legal issues associated with it range from privacy concerns to violation of the right to personal liberty and the right against self-incrimination. These issues primarily arise due to lack of a comprehensive legislative framework. A Bill labelled DNA Technology (Use and Application) Regulation Bill, 2019 was introduced but is still pending in Lok Sabha. This Bill has certain lacunae and is not up to date with the latest developments. In this background, the present article first deals with basic terminologies for better understanding of the article and then moves on to discuss the existing legal and Constitutional framework followed by judicial pronouncements. It further investigated the American position to draw inspiration for bringing an effective law in India.

3 METHODOLOGY

The present study involves different forms of legal research. The research methodology in this article is normative juridical that involves analysis of legislation and jurisprudence. This method involves analysis of existing theories and statues relevant to the subject of this study. It is often referred to as library-based approach wherein research is conducted through examination of books, laws, cases, and other relevant materials. It adopts both conceptual and statutory approaches. In the conceptual method, there is examination and analysis of perspectives and doctrines that have emerged within the realm of scientific law. This leads to the unraveling of important legal thoughts and principles as may be applicable to the research undertaken. The statutory method on the other hand involves exhaustive examination of relevant laws and regulations related to the legal discussion under consideration. So, the normative legal research employs the use of library resources as primary data within the realm of scientific study. These library materials are classified as secondary data and include primary, secondary, and tertiary legal materials, which are often referred to as supporting materials. The key legal sources for the present study are Indian Evidence Act, 1872, Constitution of India, Criminal Procedure Code, 1973, DNA Technology (Use and Application) Regulation Bill, 2019,
and other relevant statutes. Secondary legal materials such as thesis, dissertations, research articles, online resources are used to build the foundational framework. Lastly, tertiary legal materials such as legal dictionaries may also be referred.

4 RESULTS AND DISCUSSION

4.1 UNDERSTANDING THE BASIC TERMINOLOGIES

4.1.1 DNA

Deoxyribonucleic acid, commonly referred to as DNA, is the fundamental molecule responsible for encoding and transmitting genetic information essential for the growth and operation of living organisms. Deoxyribonucleic acid (DNA) consists of a pair of intertwined strands that adopt a helical structure, resembling a twisted rope ladder, sometimes denoted as a double helix. The structure of each strand consists of a backbone composed of alternating sugar (deoxyribose) and phosphate groups. Each sugar molecule is accompanied by one of four nitrogenous bases: adenine (A), guanine (G), cytosine (C), or thymine (T). The two strands of DNA are joined together through chemical bonds formed between certain bases. Adenine forms links with thymine, while cytosine forms bonds with guanine. The arrangement of nucleotide bases along the DNA molecule’s sugar-phosphate backbone is responsible for storing and transmitting vital biological instructions, including those necessary for protein synthesis or the production of RNA molecules. At its fundamental level, it is comprised of amino acids, which function as the primary building blocks for the genetic blueprint.

The genetic material within our cells, known as DNA, is derived from two parental sources: one-half originates from our biological mother, while the other half is inherited from our biological father. The genetic material that is inherited by our biological offspring constitutes 50% of their whole genetic composition. As a result of this phenomenon, it can be asserted with certainty that the DNA of each individual is entirely distinct, hence enabling DNA paternity testing to yield dependable insights about an individual’s genealogical origins and direct familial lineage.

4.1.2 DNA fingerprinting

DNA fingerprinting is a laboratory methodology employed to ascertain the likely identification of an individual by analyzing the nucleotide sequences of specific areas of human DNA that exhibit distinctiveness among individuals. DNA fingerprinting is a
widely employed technique utilized in diverse contexts, including criminal investigations, forensic applications, and the determination of paternity. In such scenarios, the objective is to establish a correspondence between two DNA fingerprints, namely between a DNA sample obtained from an individual of known identity and another sample obtained from an individual of unknown identity. To conduct the fingerprint analysis, a small quantity of DNA, typically a few micrograms, is required. DNA extraction can be performed on a diverse range of sources, such as hair, blood, cigarette butts, semen, saliva and other similar materials.

The utilization of DNA testing enables the acquisition of a relatively precise depiction of familial relationships among individuals. Although there is no explicit regulation or specific legislation governing the admissibility of forensic methods, the judicial system derives the legitimacy of these techniques from several provisions within the Code of Criminal Procedure, 1973 and the Indian Evidence Act, 1872. DNA fingerprinting necessitates consideration of the aspect of right against self-incrimination as outlined in Article 20 (3) and the implications of violating an individual’s right to privacy as enshrined in Article 21 of the Constitution of India. The judicial interpretations made under these provisions have oscillated back and forth, leading to a significant level of ambiguity concerning the legal position of DNA technology.

4.1.3 Forensic DNA Phenotyping (FDP)

DNA phenotyping, also known as molecular photofitting, is a scientific way of predicting a person’s external physical or biochemical characteristics by using genetic information from DNA sequencing or genotyping. It is a beneficial tool that aids the investigative agencies in identifying unknown perpetrators though the DNA samples collected from the crime scene. It can help in predicting a person’s appearance, his age, and biogeographic ancestry. This technology has developed in recent times and prediction related to appearance has extended beyond eye, hair, and skin color to include eyebrow color, hair loss in men, hair structure, freckles, etc. The prediction of age through DNA has also broadened from blood to more somatic tissues such as bones and saliva as well as new markers and tools for semen. There are many ethical and legal issues associated with this and countries have taken steps to regulate it by making changes in their existing legal framework.
4.2 CONSTITUTIONAL PERSPECTIVE

Articles 51A (h) and (j) of the Constitution of India, prescribe fundamental duty of citizens to develop scientific temper and the spirit of inquiry and reform and to strive towards excellence. In the landmark case of *Narayan Dutt Tiwari*, the Delhi HC reiterated the same and explained that:

“...What we wonder is that when modern tools of adjudication are at hand, must the courts refuse to step out of their dogmas and insist upon the long route to be followed at the cost of misery to the litigants. The answer obviously has to be no. The courts are for doing justice, by adjudicating rival claims and unearthing the truth and not for following age-old practices and procedures when new, better methods are available.”

For the integration of scientific techniques such as DNA technology into criminal investigations to be deemed acceptable, it is imperative that such tools adhere to the constitutional protections of right to privacy and right against self-incrimination, as stipulated in Article 21 and Article 20 (3) of the Constitution of India. The case of *Asit Kapoor v. Union of India* established the principle that no participant in a legal procedure can be coerced into undergoing any scientific test without their consent, as this would constitute a violation of their right to privacy. In *Gautam Kundu vs. State of West Bengal & Anr*, the hon’ble Supreme Court provided the following significant guidelines:

1. The matrimonial courts have the authority to order an individual to undergo specific medical examinations.
2. This order would not deem to infringe upon the right to personal liberty, as safeguarded by Article 21 of the Indian Constitution.
3. The courts must exercise such power when presented with a compelling prima facie case. If the respondent declines to undergo a medical examination despite a court order, the court will have the authority to make an unfavorable inference against them.

In the case of *Bhabani Prasad Jena*, the Supreme Court held that in case of a conflict between an individual’s right to privacy and court’s duty to find the truth then the court must in its discretion decide the need for a DNA test in the given scenario after balancing the interest of parties. Further, in *Govind Singh v. State of Madhya Pradesh*, the Supreme Court ruled that fundamental rights are susceptible to limitations in light of compelling public interest. It is evident from the Supreme Court’s numerous rulings that various facets of the right to life and personal liberty including right to privacy
are not absolute rights and may be subjected to certain limitations and on the basis of this, the utilization of DNA technology in investigations and the presentation of evidence is permitted by courts in numerous cases.

In the case of Selvi v. State of Karnataka, a Constitution Bench of the Supreme Court examined the constitutional legitimacy of DNA tests in the light of right against self-incrimination provided under Article 20(3). It observed that a crucial tool for connecting suspects to a particular crime is matching DNA evidence. The majority in Kathi Kalu Oghad case also determined that using physical samples such as fingerprints for comparison and identification does not qualify as a testimonial act for the purposes of Article 20 (3) of the Constitution of India. Therefore, in the India context, there are no constitutional barriers to the collection and retention of DNA samples that are in the character of physical evidence.

In the matter of Anil A. Lokhande v. State of Maharashtra, the Bombay HC followed the precedent laid down in the case of Kathi Kalu Oghad and asserted that the act of examining an individual and obtaining a blood sample does not inherently constitute an incriminating circumstance. Consequently, it is not justifiable to argue that the mere act of collecting a blood sample compels an individual to incriminate themselves. The prevailing stance is that DNA tests cannot be routinely requested without proper justification, as affirmed by the Apex Court in the recently decided case of Ashok Kumar v. Raj Gupta. The court emphasized that before ordering a genetic test, it is necessary for the courts to assess “the proportionality of the legitimate aims being pursued”.

4.3 ELECTRONIC EVIDENCE AND DNA TECHNOLOGY: EMERGING TOOLS IN EVIDENCE LAW

Electronic evidence and DNA technology play a vital role in modern criminal investigations as well as in civil cases, revolutionizing the way cases are solved and justice is served. With the rapid advancement of technology, these tools have become invaluable in providing irrefutable proof, identifying suspects, and exonerating the innocent. The ability to extract digital evidence from devices such as smartphones, computers, and surveillance cameras has significantly enhanced law enforcement’s ability to reconstruct crime scenes and establish timelines. Similarly, DNA analysis has revolutionized forensic science by providing accurate identification. However, the
admissibility of electronic evidence and DNA evidence in court is a complex matter that necessitates the establishment of its authenticity, reliability, and relevance.

4.3.1 Admissibility of Electronic Evidence

The widespread adoption of computers and the pervasive impact of information technology on human lives, as well as the shift towards storing information in digital formats, necessitated the modification of Indian legislation to include laws pertaining to the recognition and evaluation of digital evidence. Consequently, The Information Technology Act, 2000 (IT Act) was passed by the Indian Parliament in the year 2000. This legislation amended existing Indian statutes to render electronic evidence admissible.

The Indian Evidence Act (IEA) has undergone amendments to include provisions enabling the admissibility of electronic records. The scope of the term “evidence” was broadened to incorporate electronic records within its meaning. The term “electronic records” has been defined in accordance with its assigned meaning under the IT Act, which offers a specific interpretation i.e., “electronic record means data, record or data generated, image or sound stored, received or sent in an electronic form or micro-film or computer-generated micro fiche”.

The special provisions which were added to IEA for admissibility of electronic evidence are sections 65A and 65B. Section 65A provides that “the contents of electronic records may be proved in accordance with the provisions of section 65B”. Section 65B provides that “notwithstanding anything contained in the Evidence Act, any information contained in an electronic record, whether it be the contents of a document or communication printed on a paper, or stored, recorded, copied in optical or magnetic media produced by a computer (also referred to as computer output in the Act), it is deemed to be a document and is admissible in evidence without further proof of the production of the original, providing the conditions set out in section 65B (2)-(5) are satisfied.”

In the case of Shafhi Mohammad v. State of Himachal Pradesh, the SC has ruled that it is incorrect to withhold the benefits of advancements in evidence law that arise from the use of new techniques and devices, as long as the correctness of the recorded evidence can be established. While it is true that these devices can be vulnerable to manipulation, it is difficult to establish a comprehensive criterion for evaluating the
admissibility of such evidence. The utilization of scientific and electronic evidence can significantly aid an investigating agency in their efforts. In the case of pendente lite maintenance, the statement of husband was allowed to be recorded by the electronic device through videoconferencing as the husband was permanently living in America. The judges in the case of Arjun Panditrao Khotkar v Kailash Kushanrao Gorantyal agreed with the observation made in Anvar P. V. v P. K. Bashir and Brijmohan Singh v Saroj Pandey, where the court opined that Section 65B is a comprehensive provision that outlines the procedure for admitting electronic evidence. As a result, other provisions of the Evidence Act do not have an impact on its applicability.

4.3.2 Admissibility of DNA Evidence

In 1986, the United Kingdom employed DNA fingerprinting for the first time in a criminal case, resulting in the conviction of Colin Pitchfork for the crimes of rape and murder through the use of DNA technology. DNA testing is an accurate means of establishing an individual’s identity and is admissible in India. However, in India, there is currently no legislation guiding the investigating agencies and courts regarding the appropriate procedures to be followed in cases where DNA evidence is involved. Furthermore, it is noteworthy that the Evidence Act and the Crpc lack specific provisions for the governance of issues related to science, technology, and forensic science. The ground of relevancy of DNA fingerprinting is found under Section 45 of IEA which holds the opinions of experts relevant on the point of “foreign law, science, art, handwriting or finger impressions”. Further, section 51 also holds the grounds of such opinions relevant. The case of Kunhiraman v Manoj was the first Indian case where the court admitted report of DNA Expert as evidence under section 45 of IEA. In another matter of Surendra Koli v State of UP, the court relied on DNA evidence to confirm the imposition of death penalty on the accused for the crime of murder.

There are numerous cases such as ND Tiwari’s case under section 112, IEA which involve the question of legitimacy and parentage and where the Courts have resorted to DNA Technology for the determination of matters in dispute. The SC gave precedence to DNA test using Section 45 over the presumption of legitimacy under Section 112 in Nandlal Wasudeo Badwaik case and opined that when Evidence Act was enacted, modern technologies were not present. Hence, DNA testing was not included but in present times, DNA testing ensures accuracy and the presumption of conclusive proof under section 112.
can be rebutted.

4.4 DNA TECHNOLOGY (USE AND APPLICATION) REGULATION BILL, 2019: AN ANALYSIS

Malimath Committee report made the recommendation to enact specific legislation for use and regulation of DNA evidence and for setting a national DNA database. In the case of Thogorani Alias K. Damyanti, the Orissa High Court also concluded that in cases where biological tissues are left at a crime scene, DNA evidence is the most common forensic technique for ascertaining the criminal. Consequently, few attempts were made by the legislators to enact dedicated legislation for DNA evidence. The latest attempt was made in July 2019 by introducing the DNA Technology (Use and Application) Regulation Bill, 2019 in Lok Sabha which is pending and has been referred to Parliamentary Standing Committee. The objective of the Bill is to provide a framework for regulation of the use and application of DNA technology for identifying victims, offenders, suspects, under-trials, missing persons, and unknown deceased persons.

4.4.1 Salient Features of the Bill

The draft law establishes an autonomous DNA Regulatory Board with various responsibilities, such as supervision of DNA data banks and laboratories, to establish procedures for the dissemination of DNA profile information in both civil and criminal proceedings, to ensure that the collection and utilization of DNA samples adhere to international guidelines concerning individuals’ right to privacy and matters pertaining to civil liberties. The board is also responsible for providing recommendations on the implementation of privacy safeguards regarding the access and utilization of DNA samples. Furthermore, it will serve as a consultative body for the Central and State Government, offering guidance on matters pertaining to DNA laboratories, databanks, and all associated aspects.

Accreditation from the Board is a mandatory requirement for all DNA laboratories, necessitating strict adherence to established rules governing the collection, storage, testing, and analysis of DNA samples. The acquired data will be disseminated to both the national and regional DNA databanks. The laboratory will assume the responsibility of ensuring enough training for its personnel to enhance their proficiency in the domain of DNA testing. Additionally, it will develop essential infrastructure and
security systems to prevent sample contamination. In situations where a legal case remains unresolved or a court order has not been issued, laboratories are required to dispose of the relevant samples and provide notification to the individuals involved.

According to Section 21 of the Bill, investigative authorities are obligated to get prior consent from the individual whose DNA sample is needed, with the exception of certain specified offenses that carry severe penalties such as death or imprisonment for a period exceeding seven years. The Bill comprehensively outlines the procedures and origins for collecting samples, encompassing bodily substances, clothes, intimate bodily substances, non-intimate bodily substances, and other relevant sources.

Chapter V of the Bill outlines the provisions pertaining to the establishment of a DNA databank, specifically addressing the formation of national and regional DNA databanks. The regional data repository is obligated to disseminate the acquired data to the national data repository. A prescribed protocol exists for the dissemination and exchange of DNA profiles. The dissemination of the profiles shall be limited exclusively to individuals who have been granted authorization, with no exceptions. Furthermore, it is imperative that no comparisons be drawn unless the individual in question meets the criteria of being an offender, suspect, or undertrial. As stipulated in Section 31, the data contained within the crime scene index will be maintained and shall only be deleted under specific circumstances as outlined. The removal of the aforementioned information can also be facilitated upon request by individuals who do not meet the criteria of being an offender, suspect, or undertrial.

The proposed legislation aims to safeguard against the unauthorized disclosure of DNA profiles and other associated records. It seeks to establish stringent measures to maintain the security and confidentiality of data stored inside the DNA database and laboratory facilities. Furthermore, the dissemination of this information is restricted to certain purposes and a limited number of people, as stipulated in the legislation.

Finally, an independent segment of the Bill provides Offenses and penalties for them. Offenses include activities such as the unauthorized distribution of information derived from the data bank, the unauthorized utilization of DNA samples, the unlawful access to data, and the deliberate destruction or contamination of biological evidence, among others.
4.4.2 Criticism of the Bill

The Bill has raised significant concerns related to the right of privacy of people, given the absence of legislation in India that safeguards against data breaches. As previously mentioned, the Bill includes various measures to safeguard the confidentiality of DNA profiles, which contain significant amounts of personal information. However, it is worth noting that there are no explicit penalties outlined for the authority responsible for managing the national or regional DNA databank in the event of a data breach. Direct liability for mishandling does not extend to the higher authority. DNA data has the potential to identify significant information pertaining to diseases, allergies, hereditary behavior, and emerging medical conditions, the misuse of which is certainly a cause of concern.

One significant area of apprehension pertains to the inadequacy of training and insufficient equipment inside our criminal investigation system, hindering its ability to successfully utilize DNA technology. Furthermore, it is susceptible to potential abuse, encompassing the deliberate placement, manipulation, or mishandling of evidence at both the collection and examination stages. The presence of several technical gaps contributes to the potential manipulation of evidence. Section 57 of the Bill effectively eliminates the court's jurisdiction over any subject that is to be decided by the Board. Consequently, the courts are precluded from scrutinizing any activities undertaken by the Board, hence, granting the regulating body unrestricted authority without any check mechanisms. The aforementioned provision lacks justification and should be withheld from implementation. In the absence of legislation that establishes the liability of governing bodies for encroaching upon the inherent right to privacy of individuals, the sole recourse available to citizens is to go to court in instances of violation of rights. The absence of court jurisdiction in cases when the Board makes arbitrary and unconstitutional decisions results in a lack of available remedies.

4.5 COMPARATIVE ANALYSIS WITH USA

4.5.1 general overview

The very first case where conviction was based on DNA evidence was of Robert Melias who was convicted in the United Kingdom in the year 1987. It was during the same year that in the United States, Tommy Lee Andrews was found guilty in a rape case by the utilization of DNA evidence. In United States, the admissibility of scientific
evidence, including DNA evidence, in criminal cases is contingent upon satisfying admissibility standards. The primary guiding principles regarding the same were laid down in the case of *Frye v. United States*, District of Columbia, Circuit Court, and *Daubert v. Merrell Dow Pharmaceuticals, Inc.* a decision by the U.S. Supreme Court. The federal court system adheres exclusively to the Daubert standard, but State courts are characterized by a division in their adoption of either the Daubert or Frye standard.

According to the Frye standard, a novel scientific methodology must achieve widespread acceptance among the pertinent scientific community prior to being deemed admissible in a court of law. In the Daubert case, the Supreme Court rendered a decision that overturned the Frye ruling in Federal courts. The Court determined that the Frye ruling was incongruous with Rule 702 of the Federal Rules of evidence, which pertains to the admissibility of expert witness testimony. The general acceptance test discussed in the Frye ruling is incongruous with the two criteria outlined in Rule 702, namely relevance and reliability. The court placed significant stress on the “Gatekeeping responsibility” of the trial judges during the admission of expert witness. The factors mentioned in the list include, but are not limited to, reliability, peer reviews and publications, potential rate of error, presence of standards and controls, and overall acceptance within the scientific community. In accordance with this criterion, the court exhibited a shift towards a more permissive stance in regard to the inclusion of expert testimony, while also promoting the practice of submitting witnesses to comprehensive and rigorous cross-examination.

DNA evidence is commonly associated with DNA offender profiles by means of DNA databases. During the latter part of the 1980s, the federal government initiated the establishment of a comprehensive framework for the implementation of national, state, and local DNA databases, with the primary objective of facilitating the storage and interchange of DNA profiles. This Combined DNA Index System (CODIS) is a comprehensive system that stores DNA profiles acquired through federal, state, and local systems. These profiles are stored in a collection of databases accessible to law enforcement agencies nationwide, only for the purpose of law enforcement activities. CODIS is a forensic tool utilized to conduct comparisons between DNA profiles derived from crime scene evidence and a comprehensive database containing DNA profiles taken from individuals who have been convicted of criminal offenses. CODIS has the capability
to establish connections between DNA evidence collected from several crime scenes, therefore facilitating the identification of individuals involved in many criminal incidents.

The CODIS program was initiated as a trial project in the year 1990. The formalization of the FBI's power to build a National DNA Index System (NDIS) for law enforcement purposes occurred with the enactment of the DNA Identification Act of 1994. Subsequently, the NDIS was established and became functional in 1998. The Act granted the FBI the legal authority to create a comprehensive database including DNA identity records of individuals who have been convicted of criminal offenses. Additionally, it empowered the FBI to conduct analysis on DNA samples obtained from crime scenes and unexplained human remains. The Act additionally stipulated that the index should exclusively consist of DNA data that has been obtained through studies conducted in compliance with the Quality Assurance Standards (QAS) established by the Federal Bureau of Investigation (FBI).

The Federal Bureau of Investigation (FBI) established the Combined DNA Index System (CODIS) as a comprehensive database consisting of three hierarchical levels. This system facilitates the computerized comparison of DNA profiles by federal, state, and local laboratories. There are three distinct levels in the DNA database system: the National DNA Index System (NDIS), which is managed by the Federal Bureau of Investigation (FBI) and serves as the nation's DNA database, containing DNA profiles contributed by participating states; the State DNA Index System (SDIS), which functions as an individual state's DNA database, housing DNA profiles obtained from local laboratories; and the Local DNA Index System (LDIS), which is utilized by local laboratories. DNA profiles are initially generated at either the local or state level, and subsequently progress upwards to the state level (if originating from the local level) and eventually to the national level. The laboratory profiles must be uploaded to the National DNA Index System (NDIS) prior to their integration into the overall system.

The primary objective of the CODIS system was initially focused on the documentation and examination of DNA information pertaining to individuals who had been convicted of criminal offenses. Nevertheless, throughout the years 2005 and 2006, the United States Congress augmented the roster of individuals who are required to undergo DNA registration. In accordance with the federal regulations, 2009, each United States organization that possesses the authority to apprehend, confine, or oversee
individuals who have been found guilty of criminal offenses is mandated to collect DNA samples from individuals who have been detained, formally accused, or convicted.

The case of *Maryland v. King* resulted in a 5-4 ruling by the U.S. Supreme Court. The court upheld a state statute that allowed for the systematic collection of DNAs from individuals arrested for felony offenses. The court determined that the act of taking a buccal swab from an arrestee constituted a search under the Fourth Amendment. However, the court deemed this search to be barely intrusive and was justified by the government's interest in curbing and penalizing criminal behavior. The growth of the national DNA database in the country was significantly propelled by the advancement of DNA analysis technologies. An illustrative instance of this phenomenon can be observed in the form of a legislative proposal that was introduced in the state of Arizona in the year 2019. The proposed legislation entails the creation of DNA profiles for individuals who do not have a direct affiliation with the criminal court system. The bill specifically mandated the compulsory acquisition of DNA samples from individuals who are legally obligated to provide fingerprints during the process of applying for a license, certificate, or special permit. This requirement also extends to individuals whose employment or position necessitates the submission of fingerprints, those who voluntarily work with law enforcement agencies, deceased individuals, and those who are legally obligated to provide DNA samples for the purpose of testing familial relationships, among others.

In addition to its existing features, CODIS incorporates the utilization of quick DNA analysis. The rapid DNA technique represents a novel approach capable of expediting the analysis of DNA samples within a significantly reduced timeframe of approximately 90 minutes, in contrast to the prolonged duration of days or even weeks that was previously required. The Rapid DNA Act aims to develop a comprehensive framework for the coordination of Rapid DNA technology across law enforcement agencies throughout the United States. This is achieved by integrating Rapid DNA technology with the Federal Bureau of Investigation’s Combined DNA Index System. In 2013, the novel application of Rapid DNA technology was employed in a criminal investigation for the first time. This innovative technique was utilized to catch individuals involved in a burglary incident, wherein belongings valued at over $30,000 were unlawfully taken from the residence of an Air Force personnel residing in Florida. The proliferation of DNA collection and utilization in criminal inquiries has resulted in a
heightened workload for crime laboratories, thereby leading to a backlog of DNA samples awaiting analysis.

4.5.2 Comparison between American and Indian Legal Position

As far as use and regulation of DNA technology in criminal justice system is concerned, there are many things that India may incorporate taking inspiration from USA. A brief overview of the prevalent positions in both the countries regarding use of DNA has been discussed below:

a. Legal Framework: While it has already been discussed that India does not have a comprehensive legislation on the subject and it is as of now governed under provisions of different legislations such as Indian Evidence Act and Criminal Procedure Code along with judicial decisions. USA on the other hand brought the Violent Crime Control and Law Enforcement Act in 1994 that permitted the Federal Bureau of Investigation to establish a DNA database. On this basis, the Combined DNA Index System (CODIS) was developed. The functioning of national DNA database is being governed by the DNA Identification Act of 1993 which also established the National DNA Index System (NDIS). Further, the DNA Analysis Backlog Elimination Act of 2000 deals with collection of DNA samples from people who are detained at federal level, convicted of federal offences, have been on probation, have been released on parole or are under supervision. This list was further expanded in 2005 and 2006. Later in 2009, federal regulations were brought, on the basis on which any US agency that arrested, detained, or supervised a person convicted of a crime could take DNA samples from such persons (Criminal Justice and Public Order Act, 1994). After this, 28 States brought similar regulations. The approach in the USA has been towards the expansion of the national DNA database which was reflective from the bill No. 1475 introduced by the Senator of Arizona. The bill required mandatory collection of DNA samples by people applying for different documents such as license, certificate or special permit, persons employed with law enforcement agencies, etc.

b. DNA Database: Even though India uses DNA profiling in police investigation, it does not have any database. The 2019 bill as mentioned above contains a provision for setting up of DNA databases both at national and State
level. The significance of establishing DNA database has been emphasized by forensic experts and Supreme Court lawyers as it can help in solving blind cases and catching repeat offenders. It will also have a deterrent effect. As per the Assistant Director of the Directorate of Forensic Services, Himachal Pradesh, they have obtained DNA profile databasing and matching technology from the USA and are working on preparing a database. As far as USA in concerned, it already has Federal DNA Database Unit (FDDU) that helps in investigation against people whose profiles are present in the National DNA Index System. Further, NDIS is a part of Combined DNA index System as has been discussed before.

c. Infrastructure: The Forensic Science India report: A study of Forensic Science Laboratories (2013-2017) undertaken by National Law University, Delhi in collaboration with the Ministry of Home Affairs studied forensic science laboratories (FSL) in India. It is the first time that such a study was conducted and thirty FSL across 20 States and Union territories participated in it. The study is significant in the light of introduction of new criminal procedural law to replace the existing one and one of the grounds for doing so was the inadequate use of forensics which substantially obstructs speedy justice. The report mentions some shocking findings such as:

i. The labs, including the Central FSLs, failed to account for funds for R & D and many other labs revealed that they are unable to carry out research due to short staff and the high pendency of cases.

ii. The lack of judicial and legislative standard has resulted into judiciary relying on “unscientific forensic disciplines” such as admissibility of bitemark evidence which is accepted by Indian courts but not other foreign courts.

iii. The structure of forensic labs in India translates to Central, State, and Regional FSLs along with district mobile forensic units. The report found that a total of 117 functional FSLs are there out of which only 10 are accredited by the National Accreditation Board for Testing and Calibration Laboratories. Further, these labs face serious funding issues, problems in budget approvals, underutilization of budget, inadequate infrastructure, and large vacancies in government forensic labs. The Police collects samples and after keeping it in evidence room they send it to the FSLs, but in the meantime, how are these samples preserved is unknown. The labs also face pressure from the police department into determining the
priority of cases for forensic examinations and may even create influence on decision-making.

This report relied on various USA developments to suggest changes in the existing Indian scenario. For example, a 2009 report of US-based non-profit National Academy of Sciences called “Strengthening Forensic Science Academy in the United States: A Path Forward” was cited to emphasize on the need to make sure that the forensic methods being used are fundamentally valid. In another shocking incident, it was reported that around 1500 rape and murder cases are pending the Indian State of Haryana due to non-availability of DNA test kits. The Special Fast Track Court, Palwal, pointed out that there is a two year wait for the forensic reports in the case. Situations of such degree do not exist in the USA.

d. Privacy concerns: One of the reasons for bringing DNA related legislation India relates to apprehension of violation of fundamental right to privacy. India faces a complicated situation as issues like consent in giving sample, privacy, misuse of sample due to lack of infrastructure, etc., keep on emerging in the steps to bring legislative framework. While India is following a more pro fundamental rights approach, USA has been more invasive when it comes to collection of samples and maintain database. As discussed above, the USA has been following an expansive approach and has extended collection of samples from non-criminals as well.

The above comparison reflects that India needs to work in several dimensions such as comprehensive legislation, well-equipped and adequately staffed FSLs, proper budgeting and funding, and most importantly maintaining a database.

5 CONCLUSION

The utilization of DNA technology within the judicial system holds significant importance and is presently being employed effectively on a global scale. DNA is well recognized for its inherent objectivity, scientific precision and unbiased characteristics, all of which collectively enhance its efficacy as a formidable tool in combating criminal behavior. Currently, it plays a significant role in providing guidance for both civil and criminal conflicts in India. Presently, India is grappling with a multitude of issues with the application of DNA evidence including issues related to the quality and dependability of DNA samples, the absence of universally accepted techniques for the collecting and analysis of such samples, and the difficulties encountered in the interpretation of intricate
DNA profiles. Furthermore, it is important to prioritize capacity building and training programs for forensic specialists in order to facilitate the effective application of DNA evidence within the criminal justice system of India.

In light of the technical obstacles encountered in the utilization of DNA evidence, a primary legal problem arises around the protection of individuals’ right to privacy during the process of submitting DNA samples, which subsequently grants authorities access to their personal information. The fundamental right to privacy has been confirmed by the Supreme Court. The absence of a dedicated legislative framework that confers authorization for data usage, ensures the implementation of robust data security measures, and establishes accountability for any breaches or misuse of data by the governing body with access to it, renders it difficult to place full trust in the Government. The Government’s introduction of the DNA Technology (Use and Application) Regulation Bill can be interpreted as a positive step towards legitimizing the practice of DNA profiling. Nevertheless, it is not devoid of apprehensions. In order to effectively achieve the legislative objectives outlined in the DNA Data Regulation law of 2019, it is imperative to thoroughly evaluate and address the aforementioned concerns associated with the law. The required guidance and direction can be taken from the laws existing in countries like USA and UK.
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