INDIAN JOURNAL OF LEGAL REVIEW [IJLR – IF SCORE – 7.58]

VOLUME 6 AND ISSUE 2 OF 2026

APIS – 3920 - 0001 *(and)* ISSN - 2583-2344

Published by

Institute of Legal Education

https://iledu.in

PRESUMPTION OF INNOCENCE IN CRIMINAL CASES INVOLVING IDENTICAL TWINS: A DOCTRINAL ANALYSIS OF FORENSIC AND LEGAL CHALLENGES

AUTHORS – JANANI SHREE R J* & HEMAVATHY D**

* STUDENT, B. A. LL. B. (HONS.), SCHOOL OF EXCELLENCE IN LAW, THE TAMIL NADU DR. AMBEDKAR LAW UNIVERSITY, TARAMANI, CHENNAI – 600113.

** B. COM. LL. B. (HONS)., LLM., LAW FACULTY, SCHOOL OF EXCELLENCE IN LAW, THE TAMIL NADU DR. AMBEDKAR LAW UNIVERSITY, TARAMANI, CHENNAI – 600113.

BEST CITATION - JANANI SHREE R J & HEMAVATHY D, PRESUMPTION OF INNOCENCE IN CRIMINAL CASES INVOLVING IDENTICAL TWINS: A DOCTRINAL ANALYSIS OF FORENSIC AND LEGAL CHALLENGES, *INDIAN JOURNAL OF LEGAL REVIEW (IJLR)*, 6 (2) OF 2026, PG. 65-71, APIS – 3920 – 0001 & ISSN - 2583-2344. DOI - https://doi.org/10.65393/RYHO7885

ABSTRACT

The core aspect of criminal justice system of India is that an accused person is presumed innocent unless and until proven guilty. Because of this presumption of innocence, it is the prosecution's responsibility to prove guilt beyond a reasonable doubt. However, the implementation of this principle is complicated by serious forensic and legal issues that arise in criminal instances involving monozygotic (identical) twins. Due to their almost similar genetic composition, conventional forensic methods, especially Short Tandem Repeat (STR) DNA analysis, frequently fail to differentiate between identical twins. This restriction raises grave concerns about erroneous convictions and miscarriages of justice and diminishes the evidential value of DNA evidence.

This paper conducts a doctrinal examination of the presumption of innocence in identical twin cases, looking at the consequences for the burden of proof and reasonable doubt, the evidentiary and prosecutorial challenges, and the forensic limitations of conventional DNA testing. Along with the constitutional and human rights aspects involved, such as the right to a fair trial, it also examines sophisticated identification methods, their scientific validity, and their legal admissibility. In order to ensure that the integrity of the presumption of innocence is maintained in such complicated cases, the study ends with useful recommendations for bolstering evidential protections.

I. INTRODUCTION

A fundamental tenet of criminal justice is the presumption of innocence, which guarantees that each accused individual is regarded as innocent unless the prosecution establishes their guilt beyond a reasonable doubt. Individual liberty is safeguarded, trial procedures are made fair, and the State that is the prosecution side bears the whole burden of proof. Most of the time, this idea works well within recognised forensic and evidential frameworks. However, some extraordinary circumstances highlight its practical difficulties, especially in criminal instances involving identical twins.

Because they come from the same fertilised egg, identical twins have almost similar genetic profiles. Because of this, one of the most reliable types of forensic evidence, conventional DNA testing, frequently fails to differentiate between them. It is more difficult to establish either twin's guilt when the evidence from the crime scene matches them equally, which raises the

possibility of a mistaken conviction. This brings up significant issues regarding how the burden of proof, reasonable doubt, and presumption of innocence are used in genetically complicated cases. This paper attempts to analyse this concept comprehensively and derive conclusions accordingly.

II. PRESUMPTION OF INNOCENCE AND BURDEN OF PROOF IN CRIMINAL CASES:

Every accused individual must be treated as innocent until proven guilty beyond a reasonable doubt, according to the presumption of innocence, which is the cornerstone of criminal jurisprudence. According to its traditional expression in Woolmington v. Director of Public Prosecutions[94], the presumption of innocence is the "golden thread" that runs through criminal law. The idea that a wrongful conviction is a more serious injustice than a wrongful acquittal is reflected in the concept, which is philosophically supported by Blackstone's Ratio. Despite not being specifically stated in the Indian Constitution, the idea has been incorporated into Articles 14 and 21 through judicial interpretation, especially after Maneka Gandhi v. Union of India[95] broadened the definition of fair procedure. The presumption of innocence has been acknowledged by the Supreme Court more and more as a human rights-based protection essential to a fair trial.

This presumption is put into practice by the burden of proof, which assigns the prosecution full duty for establishing guilt. Section 104 of the Bharatiya Sakshya Adhiniyam, 2023, which stipulates that the person alleging a truth must provide proof, reflects this rule. Any reasonable doubt must work in the accused's favour, and they are not needed to prove their innocence. The Supreme Court reiterated in Kali Ram v. State of Himachal Pradesh that the accused must be given preference when two opinions are available. The burden of proof and the presumption of innocence work together to guarantee that only convincing, unambiguous, and legally sufficient evidence can result in a criminal conviction.

III. MONOZYGOTIC OR IDENTICAL TWINS:

When a single fertilised egg (zygote) divides into two distinct embryos in the early stages of embryonic development, monozygotic (MZ) twins—also known as identical twins—are created. Both embryos share almost all of their genetic makeup and are usually of the same sex because they come from the same ovum and sperm.[96] The type of twin pregnancy—dichorionic-diamniotic (DCDA), monochorionic-diamniotic (MCDA), monochorionic-monoamniotic (MCMA), or, in rare instances, conjoined twins—is determined by the timing of the zygotic division. The exact biological trigger that triggers this splitting is still unknown despite decades of scientific investigation. However, the fact that monozygotic twins have nearly identical genetic blueprints from birth, which serve as the basis for the forensic complications they produce, is what is legally significant.

Because traditional DNA profiling methods, especially Short Tandem Repeat (STR) analysis, rely on genetic variance to distinguish individuals, monozygotic twins pose a structural problem from a forensic standpoint. Standard DNA tests are typically unable to distinguish between identical twins since they share the same STR sequences. Minor genetic mutations and epigenetic alterations may arise over time, but they are frequently too subtle or technologically complex to identify using standard forensic techniques. Because proof beyond a reasonable doubt is necessary in criminal cases, this biological fact challenges the notion that DNA evidence inevitably leads to individualisation.

IV. CHALLENGES IN FORENSIC IDENTIFICATION IN IDENTICAL TWIN CASES

DNA profiling, also referred to as genetic fingerprinting or DNA testing, is a forensic tool

[94] [1935] UKHL 1
[95] 1978 AIR 597, 1978 SCR (2) 621

[96] National Human Genome Research Institute, Identical Twins, https://www.genome.gov/genetics-glossary/identical-twins

that uses a person's distinct genetic composition that is genetic makeup to identify them. Forensic scientists can identify victims in mass disasters and mainly establish links between DNA evidence and possible suspects in criminal cases by examining particular DNA regions, especially short tandem repeat (STR) markers.[97] Such DNA profiling made it possible to identify suspects with extreme accuracy, it transformed criminal investigations. Short Tandem Repeat (STR) profiling, which looks at particular repeating loci in the genome that differ between people, is the main method used in standard forensic analysis. STR analysis is generally regarded as trustworthy evidence and typically yields very low random match probabilities.[98] However, this dependability requires individual genetic uniqueness. That fundamental premise breaks down when monozygotic twins are involved.

Monozygotic twins come from one zygote and share identical STR loci profiles. Forensic geneticists have noted that identical twins should have the same STR profile, no matter how many loci are examined. Therefore, if DNA found at a crime scene matches one twin, it also matches the other. This scientific result is accurate but does not pinpoint individuality. It shows group identity instead.

This limitation has appeared in real cases. In the famous McNair twin case, traditional DNA evidence linked identical twin brothers but could not reveal which brother committed the crime. Courts in similar cases in Germany and Malaysia have faced similar problems, where the lack of individual guilt led to acquittals.[99] The evidentiary conundrum presented by identical twins is exemplified by a recent murder trial in France. Forensic investigators were unable to identify which brother fired the gun in the 2020 double homicide case involving 33-year-old twins Samuel and Jimmy Y. because the DNA evidence found at the scene matched both men equally because of their monozygotic genetic profiles. Because standard genetic testing cannot differentiate one twin from the other, authorities have been forced to rely on alternative evidence, such as phone records, surveillance footage, and wiretaps.[100] These examples show that while DNA is powerful, it is not always reliable in unique situations.[101]

Therefore, indistinguishability rather than error is the forensic challenge. Twin cases force courts to reevaluate presumptions about the conclusiveness of DNA evidence by exposing a structural flaw in traditional forensic science.

V. THE "TWIN PARADOX", THE STANDARD OF PROOF BEYOND REASONABLE DOUBT AND THE EVIDENTIARY CHALLENGES:

The research of identical twin cases creates a "twin paradox" which shows that scientific evidence confirms one twin committed a crime yet it fails to identify which twin was guilty. The criminal legal system does not establish guilt through probability because it requires more evidence than what shows. The United States Supreme Court established in In re Winship[102] that the Constitution mandates proof beyond reasonable doubt for criminal trials because this standard protects against wrongful convictions which have a higher risk than wrongful acquittals. Twin cases demonstrate this principle by showing that when evidence indicates both twins have a 50% chance of guilt the court must presume both twins are not guilty. The Indian Supreme Court decided in Kali Ram v. State of Himachal Pradesh that when two different interpretations of evidence exist the interpretation which supports the accused must win.

The presumption of innocence requires acquittal unless there is more specific evidence against a particular twin. Thus, the twin paradox

[97] Moreno, Lilliana I., DNA profiling, https://www.ebsco.com/research-starters/applied-sciences/dna-profiling
[98] Bruce Budowle et al., CODIS and PCR-Based Short Tandem Repeat Loci, 51 J. Forensic Sci. 56 (2006).
[99] 2009 drug trafficking case https://mumbaimirror.indiatimes.com/news/world/indo-malaysian-twins-escape-the-noose-over-identity-confusion/articleshow/15895363.html , 2009 berlin jewelry case https://time.com/archive/6946089/despite-dna-evidence-twins-charged-in-heist-go-free/
[100] https://www.bbc.com/news/articles/cn87l12e4xeo
[101] https://www.wbur.org/news/2017/03/07/twin-dna-crime-tech
[102] In re Winship, 397 U.S. 358, 364 (1970).

INDIAN JOURNAL OF LEGAL REVIEW [IJLR – IF SCORE – 7.58]
VOLUME 6 AND ISSUE 2 OF 2026
APIS – 3920 - 0001 *(and)* ISSN - 2583-2344
Published by
Institute of Legal Education
https://iledu.in

is not a loophole; it is a safeguard within the legal system. It shows that criminal liability requires personal certainty, not just collective probability.

The use of Standard Short Tandem Repeat DNA profiling faces major difficulties in criminal investigations involving identical twins because this method cannot differentiate between them. In these cases, defendants can use the "my twin did it" defence which creates reasonable doubt about their identity. The courts need to depend on circumstantial evidence which includes fingerprints surveillance footage digital location data and eyewitness testimony. The uniqueness of fingerprints exists between identical twins yet they do not appear in every situation while eyewitness identification methods tend to be unreliable. The advanced techniques of next-generation sequencing and whole genome sequencing enable the identification of uncommon genetic variations between twins, yet these techniques require expensive implementation and complex technical operations and they adhere to strict advertising standards.

VI. ADVANCED FORENSIC TECHNIQUES: POSSIBILITIES AND LIMITATIONS

The ability to distinguish between identical (monozygotic) twins in criminal investigations has greatly increased due to recent developments in forensic science. Modern genomic research demonstrates that minor biological changes can develop after the embryo separates, contrary to previous beliefs that identical twins are genetically identical. These variations open up new avenues for customised identification in criminal proceedings.

Next-generation sequencing (NGS) and ultra-deep whole-genome sequencing (WGS) are two of the most significant advancements. Instead of analysing specific markers, these technologies analyse the complete genetic code. Rare post-zygotic mutations, which are microscopic genetic alterations that occur during early development, can occur in one twin but not the other, according to scientific research.[103] In biological samples taken from crime scenes, such alterations can occasionally be found. Advanced sequencing can detect single nucleotide variants that can differentiate monozygotic twins, according to research published in Forensic Science International: Genetics.[104]

Such evidence is now being taken into consideration by courts. Ultra-deep sequencing was used to find uncommon genetic differences between twin brothers in the historic U.S. case Commonwealth v. Marubbio, which resulted in a conviction.[105] The judicial acknowledgement of genetic difference in twin-related trials was significantly advanced by this case. Similar developments to those that took place in the United States have been reported in European forensic practice. A new area of study with promise is forensic epigenetics. Although twins have nearly identical DNA sequences, environmental influences and ageing will cause their DNA methylation patterns to change. An further means of identification may be provided by the epigenetic variations between adult twins. According to studies, certain genetic locations exhibit methylation analysis, which makes it possible to distinguish one twin from another.[106] Because epigenetic patterns are dynamic, they undergo tissue-dependent alterations that raise questions regarding their stability and repeatability throughout time.

Additionally, biometric methods provide helpful resources. For instance, because the environment in the womb affects ridge creation, fingerprints are not genetically similar even amongst monozygotic twins. Dermatoglyphic patterns are still specific to each individual, according to forensic literature. High-quality

[103] Muhammad Aourangzaib et al., "Solving the twin paradox—forensic strategies to identify identical twins," Forensic Science International, Vol. 363 (2024).
[104] L. Yuan et al., "Identification of the perpetrator among identical twins using next-generation sequencing technology," *Forensic Science International: Genetics* (2020).
[105] Melody Schreiber, "Identical twin convicted based on DNA differences in first US case of its kind," The Guardian (2 Sept 2025).
[106] B. Rolf et al., "The germlines of male monozygotic twins: very similar, but not identical," Forensic Science International: Genetics (2021).

prints can offer dependable difference when they are accessible.

Machine learning and artificial intelligence (AI) have increased forensic opportunities. Subtle anatomical or textural differences between twins can be identified by sophisticated facial recognition systems and pattern-analysis algorithms. A recent study suggested machine-learning methods with high anticipated accuracy rates for identifying identical twins.[107] Despite these developments, explainability, dataset bias, and openness are issues with AI-based techniques in legal procedures.

Despite their scientific promise, these technologies exhibit significant limits. First, the cost and technical difficulty of ultra-deep sequencing and epigenetic testing restrict their regular availability in many forensic labs. Second, because of genetic mosaicism, uncommon mutations might only exist in specific organs, making interpretation more difficult.[3] Third, before allowing such evidence, courts must carefully consider methodological standards, known error rates, reliability, and peer review. The legal system that controls admissibility is still very important. According to the American standard set in Daubert v. Merrell Dow Pharmaceuticals, Inc.[108], scientific evidence must be trustworthy and pertinent. Before emerging twin-differentiation methods may enable proof beyond a reasonable doubt, they must meet these requirements. Expert evidence provisions in other jurisdictions need a similar level of prudence.

In conclusion, the scientific gap in identical twin cases has been reduced thanks to sophisticated forensic procedures. Powerful tools for personalised identification include whole-genome sequencing, epigenetic profiling, biometric analysis, and AI-based systems. However, judicial caution must be matched with technical competence. To guarantee that scientific advancements reinforce the presumption of innocence rather than weaken it, reliability, transparency, accessibility, and due process protections are still crucial.

VII. CONSTITUTIONAL AND HUMAN RIGHTS DIMENSIONS

In criminal cases containing scientific ambiguity, like those involving identical twins, the constitutional and human rights issues become particularly important. No one may be deprived of their life or personal freedom until a legal process is followed, according to Article 21 of the Indian Constitution. The Supreme Court made it clear in Maneka Gandhi v. Union of India[109] that the process must be "fair, just, and reasonable." Therefore, it may constitute a violation of Article 21 if someone is found guilty without specific, unambiguous proof of guilt, especially in cases where forensic evidence cannot definitively discriminate between two people.

Equal protection under the law and equality before the law are guaranteed by Article 14. This implies that criminal culpability cannot be imposed just because two people have the same genetic makeup; rather, it must be established on an individual basis. In a similar vein, Article 20 safeguards people from arbitrary criminal liability, including protection from double jeopardy and ex post facto laws, emphasising that punishment must strictly adhere to legal and proven guilt. By ensuring rights like access to legal counsel and knowledge of the reasons for an arrest, Article 22 further protects procedural justice. When taken as a whole, these clauses reinforce the requirement that the accused be found guilty based on precise and trustworthy evidence.

Additionally acknowledged as a basic human right is the presumption of innocence. The Supreme Court reiterated that an accused person is presumed innocent unless and until proven guilty beyond a reasonable doubt in

[107] L. Shravani et al., "Identical Twin Recognition in Crime Solving Using Machine Learning," IJIRT (2025).
[108] 509 U.S. 579 (1993)
[109] Maneka Gandhi v. Union of India, (1978) 1 SCC 248.

Narendra Singh v. State of Madhya Pradesh[110]. Article 14(2) of the International Covenant on Civil and Political Rights echoes this idea globally. Courts must be extremely cautious to prevent wrongful convictions when scientific methods, like standard DNA profiling, are unable to definitively identify which twin committed the crime.

Advanced genetic testing raises privacy issues as well. The Supreme Court acknowledged informational privacy as a fundamental right under Article 21 in Justice K.S. Puttaswamy v. Union of India.[111] This protected area includes genetic data. Whole-genome sequencing is one technique that could provide a wealth of biological and personal information unrelated to the alleged crime. In order to protect constitutional rights under Articles 14 and 21, courts must make sure that the application of such testing is proportionate, restricted, and strictly necessary.

VIII. ETHICAL CONCERNS AND RISK OF MISCARRIAGE OF JUSTICE

Twin cases present significant moral dilemmas. The moral basis of criminal punishment is compromised when an accused person is found guilty based on probabilistic guilt. In Sharad Birdhichand Sarda v. State of Maharashtra, the Supreme Court stressed that all theories of innocence must be ruled out by circumstantial evidence.[112] This requirement is frequently not met by twin cases. Additionally, ethical concerns about data retention, surveillance, and genetic privacy are brought up by advanced sequencing. In S. And Marper v. United Kingdom, the European Court of Human Rights ruled that keeping DNA profiles for an indefinite period of time may violate people's right to privacy.[113] Innovation and caution must be balanced in ethical criminal justice.

IX. SUGGESTIONS AND REFORM PROPOSALS

1. To ensure accuracy and avoid erroneous convictions, the State should support scientific research and establish standard forensic procedures to reliably distinguish identical twins.
2. Strict admissibility guidelines must be established by courts for DNA evidence, allowing sophisticated methods only when they are genuinely required and supported by science.
3. In accordance with constitutional principles, whole-genome sequencing should be used carefully, gathering only information pertinent to criminal activity and protecting genomic privacy.
4. Strong independent corroborating evidence is required to support any conviction in twin-related cases; DNA evidence alone should not be sufficient.
5. To prevent injustices, judges and forensic specialists should be routinely trained on the scientific constraints and legal dangers associated with twin-identification cases.

X. CONCLUSION

The structural limitations of forensic certainty are revealed by identical twin cases, which also serve to reinforce the presumption of innocence's ongoing significance. The constitutional requirement of individualised proof beyond a reasonable doubt is still in place even though scientific developments like whole-genome sequencing offer promising solutions. In the end, the twin paradox serves to reaffirm a basic reality: criminal justice must put protection against erroneous convictions ahead of the pursuit of statistical certainty.

XI. REFERENCES:

1. The Constitution of India, 1950.
2. The Bharatiya Sakshya Adhiniyam, 2023.
3. Muhammad Aourangzaib et al., Solving the Twin Paradox-Forensic Strategies to Identify the Identical Twins, 363 Forensic Sci. Int. 112205 (2024), https://doi.org/10.1016/j.forsciint.2024.112205
4. Asogwa T.C. Chijindu & Ituma Chinagolum, Machine Learning Based Digital

[110] Narendra Singh v. State of Madhya Pradesh, AIR 2004 SUPREME COURT 3249
[111] Justice K.S. Puttaswamy v. Union of India, (2017) 10 SCC 1.
[112] Sharad Birdhichand Sarda v. State of Maharashtra, (1984) 4 SCC 116.
[113] S. And Marper v. United Kingdom, App. Nos. 30562/04 & 30566/04.

Recognition of Identical Twins to Support Global Crime Investigation, 7 Int' IJ. Latest Technol. Eng., Mgmt. & Applied Sci. 18 (2018) https://www.researchgate.net/publication/395357909_Machine_Learning_Based_Digital_Recognition_of_Identical_Twins_to_Support_Global_Crime_Investigation

5. Jacqueline Weber-Lehmann et al., Finding the Needle in the Haystack: Differentiating "Identical" Twins in Paternity Testing and Forensics by Ultra-Deep Next Generation Sequencing, 9 Forensic Sci. Int. Genet. 42 (2014), https://doi.org/10.1016/j.fsigen.2013.10.015

6. Article titled Identical twin convicted based on DNA differences in first US case of its kind https://www.theguardian.com/us-news/2025/sep/02/identical-twin-convicted-dna

7. Alison Gee, Twin DNA test: Why identical criminals may no longer be safe, https://www.eurofins.com/media/2448/twin-dna-test-why-identical-criminals-may-no-longer-be-safe.pdf

8. Turrina S, Bortoletto E, Giannini G, De Leo D. Monozygotic twins: Identical or distinguishable for science and law? Med Sci Law. 2021 Jan;61(1_suppl):62-66. Doi: 10.1177/0025802420922335. PMID: 33591870.