OBSERVARE
Universidade Autónoma de Lisboa
e-ISSN: 1647-7251
VOL. 16, Nº. 2
November 2025-April 2026

JANUS.NET
e-journal of International Relations

ROLE OF FORENSIC SCIENCE IN PROTECTING HUMAN RIGHTS AND ENSURING JUSTICE

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Abstract

Right to Speedy trial has been recognized by the Supreme Court of India as an intrinsic human right. However, there is failure in adequately protecting this right of the victims because there is insufficient and inadmissible evidence that can stand the scrutiny of the court. The prosecution bears the burden of proof in criminal trials under the Anglo-Saxon type of jurisprudence that is adopted in India, with oral testimony serving as the primary source of proof. Experience has demonstrated that most of the time, oral testimony is not accepted because of some very pertinent issues. Witnesses examined long after the event are unable to remember the significant and minute details of the crime in question, or they provide false testimony in response to coercion, intimidation and incitement. Some even turn hostile in the Court leading to complete turnaround of the case having devastating results for the victim. Besides, due to lack of sufficient evidence and pressure to resolve the case within specified deadlines, the use of third-degree techniques and other criminal tactics, such as torture, is a trend among investigating officers. These practices can be completely avoided when evidence collected by using forensic methods which has a greater admissibility in the court of law and can fix the onus of crime on the accused resulting in delivering timely justice to the victim. The article focusses on the role of forensic Science for protecting human rights and covers cases both from primary and secondary sources to prove this hypothesis to be factual and real.

Keywords

Evidence, Security, Interrogation, Prosecution, Training.

Resumo

O direito a um julgamento rápido foi reconhecido pelo Supremo Tribunal da Índia como um direito humano intrínseco. No entanto, há falhas na proteção adequada desse direito das vítimas, pois não há provas suficientes e admissíveis que possam resistir ao escrutínio do tribunal. A acusação tem o ônus da prova em julgamentos criminais sob o tipo de jurisprudência anglo-saxónica adotada na Índia, com o testemunho oral servindo como fonte primária de prova. A experiência tem demonstrado que, na maioria das vezes, os depoimentos orais não são aceitos devido a algumas questões muito pertinentes. Testemunhas interrogadas muito tempo após o evento são incapazes de se lembrar dos detalhes

significativos e minuciosos do crime em questão, ou prestam depoimentos falsos em resposta a coação, intimidação e incitamento. Algumas até se tornam hostis no tribunal, levando a uma reviravolta completa no caso, com resultados devastadores para a vítima. Além disso, devido à falta de provas suficientes e à pressão para resolver o caso dentro de prazos específicos, o uso de técnicas de terceiro grau e outras táticas criminais, como a tortura, é uma tendência entre os investigadores. Estas práticas podem ser completamente evitadas quando as provas são recolhidas através de métodos forenses, que têm maior admissibilidade em tribunal e podem atribuir a responsabilidade pelo crime ao arguido, resultando na justiça oportuna para a vítima. O artigo centra-se no papel da ciência forense na proteção dos direitos humanos e aborda casos de fontes primárias e secundárias para provar que esta hipótese é factual e real.

Palavras-chave

Provas, segurança, interrogatório, acusação, formação.

How to cite this article
Srivastava, Aparna & Tomar, Shivani (2025). Role of Forensic Science in Protecting Human Rights and Ensuring Justice. *Janus.net, e-journal of international relations*. VOL. 16, Nº. 2, November 2025-April 2026, pp. 429-444. DOI https://doi.org/10.26619/1647-7251.16.2.23

Article submitted on 20th August 2024 and accepted for publication on 05th September 2025.

JANUS.NET, e-journal of International Relations
e-ISSN: 1647-7251
VOL. 16, Nº. 2
November 2025-April 2026, pp. 429-444
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ROLE OF FORENSIC SCIENCE IN PROTECTING HUMAN RIGHTS AND ENSURING JUSTICE

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Introduction

The goal of forensic scientists is to collect and analyze evidence from the crime scenes with a purpose to help the investigation and prosecution of crime perpetrators and an intent to clear an innocent person of suspicion. The first forensic human rights expedition was conducted by the skilled forensic anthropologist Clyde Snow in Argentina. It was the grandmothers of the missing in Argentina had an ardent and tenacious desire to find out what had happened to their loved ones which had inspired this expedition. In addition to offering some closure and aiding in the healing process for friends and family, the forensic mission also produced evidence that may be used in criminal prosecution.

The first Central Fingerprint Bureau of India was founded in 1897 in Kolkata, India and started operating in 1904. Under the Department of Biotechnology, a cutting-edge Centre for DNA Fingerprinting and Diagnostics (CDFD) has been built in Hyderabad. DNA profiling is currently being used by police departments, forensic institutes, and wildlife agencies to identify people and animals from biological fluids and tissue samples in criminal cases involving murder, suicide, sexual assault, terrorism, and other crimes. Over 80 colleges and universities can be found in India, including the National Forensic Science University in Gandhinagar, Gujarat, and Rashtriya Raksha University in Lavad, Gandhinagar, where the School of Forensic Science & Risk Management also provides education, research, and training to students., Police and Paramilitary forces for security (National Forensic Science University, 2024).

A deeper comprehension of the nature of unlawful acts and offenses, the essential qualities and innate disposition of criminal minds and social control mechanisms is made possible by the application of knowledge from science, technology, medicine and related fields in resolving disputes. Physical evidence, whether biological (such as a cadaver, skeletal remains, bloodstain, or saliva on an envelope) or nonbiological (such as projectiles, synthetic fibres, and other things pertinent to an investigation— are analysed to provide a scientific base and a tangible proof to the investigation process. The conclusions then are quantifiable and grounded in a sequence of observable procedures acknowledged by the judiciary.

At the same time, it is important to recognize that forensic science does not merely serve the criminal justice system but also plays a central role in the protection of human rights.

By providing impartial, scientific evidence, forensic methods protect individuals from wrongful convictions, reduce reliance on coerced confessions or torture, and strengthen the right to a fair trial. They also uphold the dignity of victims by identifying missing persons, restoring the truth of state abuses such as enforced disappearances, and ensuring accountability in cases of extrajudicial killings or custodial deaths. Thus, forensic science functions as both an investigative tool and a guardian of fundamental human rights.

Literature Review

In his book, "Forensic Science- An Introduction to Scientific Crime Detection", Wall (2008) presented an extensive and update understanding of the overall context for expert scientific evidence as well as how scientific methods are applied in the administration of law, particularly in the criminal justice system. The author without assuming any scientific background on the reader's part, has thoroughly discussed every advancement in technology in the field today. Lee & Pagliaro (2013) explained that, by using forensic methods and plan of action, advance law enforcers have remarkably increased their capacity to resolve crime offences. In present scenario, cases can often be solved with forensic evidence investigation and a thorough and careful crime scene examination. Forensic scientists play a vital role not just in criminal investigations and prosecutions but also in civil litigation, major natural and man-made disaster relief efforts, and the investigation of transnational crimes. Forensic evidence analysis requires a team-oriented system, advanced investigative tools and methods (such as GPS tracking, cell phone tracking, video image analysis, artificial intelligence, and data mining), and the ability to properly process a crime scene by locating, obtaining, and preserving all relevant physical evidence.

Rudin & Inman (2000) have proposed that reconstruction, or attempting to help ascertain the causes, process, timing and place of the incidence or criminal act and the associated or engaged offenders, is at the core of science's application to the legal field. evidence that has undergone forensic investigation to help the court establish tangible facts to settle a criminal or civil issue.

Further, Irons & Lallie (2014) identified the importance of digital forensic and suggested that, the ability of digital investigators to apply digital forensics and investigative procedures to obtain timely results is under increasing strain due to the rise in cybercrime, the complexity of the various types of cybercrime, and the constraints on time and resources—both computational and human—when addressing cybercrime. The limitations and capabilities of the forensic tools currently in use must be overcome to better utilise the resources at hand and address the issues.

According to Hollien (2002), voice-based evidence is a crucial component of many criminal investigations and frequently consists of recordings made during police questioning, robberies captured on camera, or threats left on an answering machine. In the era of mobile phones, voicemail, and speech recognition software, technology is everywhere. The book emphasizes strategies and procedures for assessing recorded data and aids in understanding the fundamental sciences underlying voice recognition along with exacting analysis of the scientific data regarding how well crime prevention works in the US, the UK, and other countries. It examines over 600 scientific assessments of

crime prevention initiatives throughout seven domains: households, schools, communities, workplaces, law enforcement, and courts/corrections, strategies and processes for reviewing documentary evidence. According to Fisher (2009), among the most crucial tools a forensic scientist uses is observation. The ability is used in two distinct contexts: one involves searching a scene or an object in the lab for goals or characteristics that could produce important evidence upon additional testing, and the other involves identifying a substantial category of evidence that we can broadly refer to as pattern evidence. The fundamental idea behind pattern evidence is that physical objects have the ability to create impressions on other materials. By analysing these impressions or marks, one can determine whether or not the object of interest left the mark. Therefore, without downplaying its significance, pattern matching is a skill that criminalists use as part of their evidence processing.

Additionally, the literature on forensic science increasingly emphasises its human rights dimensions. Scholars such as Ferrándiz (2013) and Wagner (2019) have highlighted how forensic anthropology has been used to address enforced disappearances in Latin America, especially in Argentina and Guatemala. Similarly, UN reports (OHCHR, 2016; UN Working Group on Enforced Disappearances, 2020) stress that forensic tools are indispensable in documenting torture, mass graves, and war crimes. This literature demonstrates that beyond crime-solving, forensic science is a mechanism for truth, reconciliation, and justice in societies dealing with human rights abuses.

Central Question - Protection of human rights is possible through forensic science

Many cases in the past have demonstrated that most of the time, oral testimony is not accepted. Examined long after the occurrence, witnesses often forget specifics of what happened or provide false testimony due to coercion or threats. These coercion and threats may vary due to the psychological as well as physiological aspects of eyewitness testimony. In contrast, forensic evidence is of a higher calibre and is more likely to be admitted into evidence in a court of law.

On the other hand, advancement in science and technologies has led to newer techniques and methods of criminal's 'modus operandi' widening the field of crime. Therefore, investigation techniques and further processes need to be modified to meet the demands of present criminal cases to combat increasing rate of the acquittal and protect the human rights of both side and at large give clear message in society also. To prevent the rising rate of acquittal and safeguard the human rights of all parties involved in criminal cases, investigation methods and subsequent procedures must be adjusted. In addition, when there is insufficient proof very often, the investigating police have a predisposition to utilise illegal measures, like torture and third-degree procedures. Such practices can be completely avoided when evidence gathering can demonstrate the accused person's innocence.

Forensic science therefore strengthens human rights in two ways: by protecting victims' rights to justice and dignity, and by protecting the accused from wrongful prosecution. It ensures that justice is based on evidence rather than coercion, aligning criminal justice with the constitutional guarantees of equality, liberty, and fair trial.

Realizing the significant & a positive role of forensics to play in various cases, huge funds have been given to States & Central forensic labs for building forensic capacities in India. Under the

Nirbhaya Fund and Police Modernization Scheme, forensic infrastructure is being developed. Specialised centres such as the University of Gujarat, Gandhinagar, are being established, particularly following the 2018 Criminal Law Amendment Act. In the past two years, more than 200 crores have been approved for forensic science (Kathane, et al., 2021)

Main arguments on Protecting Human Rights with Forensics via case studies.

Case Study One

On 07-07-2015, the complainant Roshani Aged 13 years (daughter of deceased) resident of village Kalpa Distt Kinnaur, Himachal Pradesh, India got recorded her statement U/S 154 CrPc. before Chowki Incharge Kalpa and stated that her father had died and she (complainant), her two younger brothers are living at Kalpa in a single room along with their mother (deceased). Amila was stated to worked in Rolling Rug Hotel Kalpa. She stated that on 05-07-2015 her mother namely Amila and aunt Kiran had gone to Kalpa Depot in order to bring kerosene oil. At about 11A.M. her mother and aunt Kiran brought kerosene oil and came back in a white-colored vehicle. After some time, her mother and her aunt Kiran had gone towards chuglig pangi in the same white colored vehicle inside of which one Surender S/O Shyam Lal (accused) was sitting. While living kalpa the deceased Amila had told her daughter Roshani (complainant) that she will come back soon. But said Amila did not come back on that day and on this, the complainant kumari Roshani made search of her mother on her own and enquired from Hotel Rolig Rug wherein the deceased was stated to be working, and the complainant came to know that her mother had not come for work in the above stated hotel. Thereafter, the complainant lodged a missing report in Police Chowki Kalpa. Based on the above statement of complainant, a case FIR No. 27/15 Dated 07-07-2015, U/S 364 IPC was registered in P.S Reckong Peo. This was a blind murder case and there was no direct evidence. Even the corpus (dead body) of deceased could not be recovered for further investigation and as such whole of the prosecution case was based upon circumstantial evidence. However, the investigating agency collected all the important circumstantial evidence carefully against the accused *as a result of which the case ended in conviction.*

Last seen theory

There was sufficient evidence on record that during the evening/night of 05.07.2015 the deceased Amila was in the company of accused from Kalpa to Rampur and again from Rampur to Kalpa. During investigation the relevant register containing the necessary entries with respect to the movement of the vehicles passing from Police Check Post Chaura was checked and on the basis thereof, it was found that accused along with two female had crossed the barrier of above Check Post on 5-7-2015 at 4.40 P.M. in his vehicle i.e. white colored Tavera H.P.- 01A -2992 and on the same date had returned

from Rampur and had gone towards Kinnour in the same vehicle along with a female at 8.42 P.M. and that on the next day at about 1.55 P.M. he had gone towards Rampur in the same vehicle with four other persons. Also the woman travelling with the accused on above date and time was duly identified as Amila (deceased) by seeing her photograph by witness Hem Chand, who was posted at Police Check Post Chaura on 5-7-2015 from 6.00 PM to 10.00 PM. *It is a established law that because there was such a short period of time between when the accused and the deceased were last seen alive and when they were discovered dead, it was impossible for anybody other than the accused to have committed the crime.* In this case none has seen the deceased after she had gone missing nor had anyone heard anything about her.

Under the above circumstances onus was upon the accused to show that the deceased is still alive and further to explain as to how and what circumstances, the deceased had suddenly gone missing. Section 106 of Indian Evidence Act clearly provides that when any fact is especially within the knowledge of any person, the burden of proving of that fact is upon him. (*State of West Bengal Vs. Meer Mohammad, Umar & others 2000(8) SCC 382).* In this case the Ld. Court has held that the only reasonable conclusion which could be drawn from the aforementioned facts is that it was the accused who had done death of the deceased and thereafter, with the intention to save himself from the legal punishment had disposed of her dead body in all probability in Satluj River to destroy the incriminating evidence against him.

Call Detail Record (CDR) Analysis

During Investigation, the record of call details of accused, witness Kiran and of the deceased showed that on 05.07.2015 at about 8.50 PM the deceased and accused were at place Badhal. The above evidence corroborates the version of witness Kiran. Thus, in view of above CDR analysis, it could be safely concluded that the deceased was in the company of accused in his vehicle on the date and time in question and as such the last seen theory evidence in this case is fully established.

Presence of various personal articles and blood of the deceased on the road near the house of the accused

On the next morning i.e. 06.07.2015 at about 6.30 AM witness Bhag Chand made a report to ASI Narbeer Singh the then Incharge of Police Post Kalpa, that while he had gone for a morning walk on old Hindustan Tibbet Road, he had found near Vanvihar Ganghut Kalpa a jacket, chapal and some patches of blood on the road. On the basis of this information, said Bhag chand accompanied by Police personnel went to the spot and brought there from the above stated articles. All the articles stated above recovered by the Police from the road were later- on identified by witness Roshni to be of her mother Amila (deceased).

DNA Evidence

On 07.07.2015, the vehicle of the accused was found parked on the side of the road at place Dhali (Shimla) and accused was found sitting in the vehicle in an inebriated

(intoxicated) condition and appeared to have consumed some insecticide as two half-filled bottles were also found inside the vehicle and accused was also found vomiting. The vehicle of the accused was taken into possession by the I.O. and the same was sent to SFSL Junga, where the forensic team of the laboratory lifted blood samples from the cover of the middle seat and foot mat of the vehicle.

During investigation, blood sample of witness Roshni (daughter of deceased) was obtained. Blood samples lifted from the spot along with the jacket identified as of Amila (deceased) having blood smears and the blood samples lifted by the forensic expert from the seat cover of the middle seat and foot mat of vehicle of accused were examined by the serologist and DNA expert. After examination, they opined that blood samples lifted from the road near Van Bihar Kalpa, the jacket, the trouser of accused and the seat cover of the vehicle of accused matched with the DNA profile obtained from the blood sample of witness Roshani (daughter of deceased). During the trial of this case, the accused failed to explain and remain silent how and in what manner the blood of deceased was found on his trouser and also on the seat cover of his vehicle.

Act and Conduct of the Accused

After commission of crime, the accused left for Shimla and tried to commit suicide there. He was admitted in IGMC Shimla and Dr. Pradeep examined the accused. The accused again failed to give any explanation that why he left Kalpa, immediately after the occurrence and what were the circumstances which compelled him to commit suicide.

The above act and conduct of the accused give support to the case of prosecution that since accused had come to know that the police had suspected his involvement in the commission of the crime and had been searching for him, so on account thereof, he had come under the extreme mental pressure and had tried to commit suicide by consuming insecticide on 07.07.2015 with the intention to escape from legal punishment.

Interrogation of the accused

After his discharge from IGMC Shimla, the accused was formally arrested by S.H.O Laxman. While in custody accused confessed his guilt and disclosed that on the night of 05-7-2015 he had crushed Amila (deceased) with his vehicle at place near Van Bihar Kalpa when she had refused to oblige him to sexual intercourse with him and thereafter, he had put her body in a sack and thrown the body thereof in river Satluj from the cliff with the intention to destroy incriminating evidence against him. In this regard the statement of accused was recorded in presence of the witnesses and thereafter he gave identification of the place where he crushed the deceased with his vehicle and of the place from where threw the dead body of the deceased in Satluj river.

All above circumstantial evidence collected by the I/O during investigation was found sufficient as the chain of circumstantial evidence was complete in all respect to bring home the guilt of accused, therefore, the Ld. Court convicted the accused U/S 302, 201 and 309 IPC.

This case illustrates that even without direct evidence, forensic methods like DNA analysis preserved the right to justice for the victim's family while safeguarding due process.

Instead of relying on confessions extracted through force, the court reached its decision on the basis of scientific, verifiable evidence, reinforcing the principle of fair trial.

Case Study Two Rape on pretext of Marriage with minor girl of SC Category

In 2012 complainant Kumari Sheela lodged her statement that she is studying in 8th class at GSSS Sultanpur District Solan. Her father was working as Mason with Sh. Yash Pal Thakur and mother is working at Soolani University, Bazol. Anil Thakur working as driver, frequently loitered nearby to her house and compelled her for friendship, but she refused. He persuaded and promised to marry her and she agreed for friendship. In the month of December,2011 when she was coming on foot from Rampur after tuition, towards her school, anil thakur took her to the secluded place near Veterinary Hospital and raped her. On 16/02/2012, she went to collect fuel wood from the forest, at about 12PM and Anil Thakur came there and have sexual intercourse with her. After sexual intercourse, he threatened her that if she discloses this matter, he will commit suicide. But she disclosed this matter to her parents. On disclosure of aforesaid matter, victim's parents tried to contact accused Anil Thakur, but he insulted and threatened to kill her parents. As this case was registered under Scheduled Castes/Scheduled Tribes (Prevention of Atrocities) Act, so as per the provisions of this Act, investigation of this case was done by Sh. Rajesh Kumar Chhabra, DySP the then SDPO Parwanoo.

On 17/02/2012, complainant Kumari Sheela got her statement recorded at PP Dagshai, which was sent for registration of case to PS Dharampur. After registration of case, ASI Mehar Chand immediately sent complainant for medical examination to Civil Hospital Dharampur. Thereafter, Medical Officer, CHC Dharampur referred her to Regional Hospital Solan on the same day, where she was medically examined**.** M.O preserved all the samples and handed over to Police for forensic examination. After medical examination of victim, the Medical Officer, Regional Hospital, Solan opined that "In my opinion there is nothing to rule out the possibility of recent sexual intercourse, however final opinion will be given after report of forensic analysis"

On 18.02.2012, based on the statement of the victim, the accused was arrested after adopting all codal formalities as warranted under law and interrogated. During interrogation, he revealed that victim is his friend and on the pretext of friendship, he had sexual intercourse with victim. Accused also revealed that victim agreed to marry him, but her parents and relatives were not happy with this episode. Accused Anil Kumar was produced before Medical Officer, CHC Dharampur for medical examination on 18/02/2012. M.O. issued MLC of the accused Anil Kumar. In the MLC of accused Anil Kumar, M.O. opined that "Mr Anil Kumar S/o Sh Amar Singh there is nothing to suggest that he is not capable of performing sexual intercourse however opinion is reserve *till the report come from forensic lab*."

During the course of investigation IO/ DySP visited the Scene of Crime. Videography/photography of occurrence was conducted from all angles. Spot Map was prepared by indicating all necessary points of occurrence in the map. IO/Dy.SP inspected the spot in depth and collected the physical evidence's i.e. clothes of victim & accused and seized as per procedure. The dockets (clothes of victim, swab, vaginal slid, hair, FTA Card &

DNA) were sent to FSL Junga for further chemical examination & analysis. All exhibits preserved by Medical Officer i.e victim's clothes, vaginal swabs, vaginal slides, pubic hairs and accused person underwear, DNA test on FTA card and sent for chemical examination to FSL, Junga. Accused Anil Thakur was in judicial custody on 21/02/2012 for fourteen days, which was further extended and was ensured that accused, could not get bail upto the presentation of the final report. Prime facie case was made out against the accused person. Hence, challan U/s 376 IPC & 3(1) (XII) SC/ST Act 1988 was prepared by SHO Sh. Pritam Singh, Inspector, dated on 17/03/2012. After receiving expert report from FSL Junga same was produced before Medical Officer RH Solan for final opinion on MLC. The Medical Officer opined that "there is nothing to rule out the possibility of recent sexual intercourse and final opinion pertains to accused Anil Kumar is remain same as dated 18/02/2012".

The case was tried in the LD Court of Session Judge, Solan. The accused convicted by the LD Court on 26/08/2014. LD Court of Session Judge, Solan announced the decision in different penal sections i.e. on 26/08/2014 and 27/09/2014, respectively. The convict was sentenced to rigorous imprisonment for a period of 10 years and to pay a fine of rupees 25,000. Under the SC/ST Act, the convict is sentenced to rigorous imprisonment and to pay a fine of rupees 25,000.

Scientific investigation played a key role in the conviction of accused in this case. During investigation under garments, vaginal swabs, pubic hairs of victim, underwear and blood of accused were sent to FSL for chemical analysis and DNA profiling. DNA profile obtained from the exhibits of victim matches completely with the DNA profile obtained from the exhibits belonging to accused (Case Study, 2006).

Here, forensic science upheld the dignity and rights of a minor victim by substantiating her testimony through scientific evidence. The reliance on medical and DNA evidence meant that her claims were not dismissed as mere allegations, demonstrating how forensics can empower vulnerable groups in seeking justice.

Case Study Three

The use of cutting-edge forensic science tools has served as a vital link in solving the Kotkhai gangrape and murder of 16-year-old Gudiya.

The Central Forensic Science Lab of the Central Bureau of Investigation (CBI) was the only resource that allowed the CBI to solve the case in nine months. The CBI focused in on Anil Kumar, also known as Nilu, a 25-year-old man. A thick woodland is the crime site, where the victim was raped and killed. The cops began their search and gathered all the evidence, including clay from the crime scene, spirits bottles, blood samples and samples of semen. Afterwards, more than 250 local residents' blood samples were gathered to compare them with the semen and additional DNA samples.

Additionally, the police took statements from 400 persons and questioned nearly 2000 people. The first results were negative when the CFSL began comparing the DNA of 250 individuals with the accused's semen. Afterwards, the CFSL performed "lineage test" and "percentage test" on all 250 samples, and happily, the results matched the sample. Blood samples were taken from both parents once more after the sample matched with a

Kangra family. Investigation revealed that one of the family members has not been in contact with the family since September 2016, when he went missing.

The Kotkhai case highlights how forensic science becomes indispensable when crimes occur in remote areas with minimal witnesses. By scientifically establishing guilt, the state was able to fulfil its responsibility to protect the victim's right to life and security while ensuring accountability of the perpetrator.

Case Study Four

Mumbai serial rapist-murderer case

Rehan Qureshi from Navi Mumbai allegedly had raped several minor girls and was a serial killer. Two of the girls who died were four and nine years old. The entire police force was under pressure to solve the case after three girls, aged 5 to 9, were raped and killed in June 2010. One victim was discovered in a gunny bag, while another was discovered on the terrace of the police quarters.

Police conducted thorough investigations, searched history sheets, distributed their informers, visited mental hospitals in search of missing inmates, etc. and with the help of Maharashtra Forensics lab performed more than 500 DNA tests on all suspected individuals including the son of a top official. Although their efforts failed to find the murderer, it was discovered that two murderers were involved in the crime, one of whom was apprehended and sentenced to prison. The case remained unresolved till 2017, however, till it was handed over to Maharashtra CID in 2012. With the added assistance of CCTV, the police were able to narrow down their search this time to a suspect who was wearing a blue shirt and was usually on the phone, most likely listening rather than speaking. They suspected him of being a salesman. Despite being captured on camera, he remained unaccounted for, with a fresh assault case being reported every week.

One day police patrolled the vicinity of Mira Road in the Naya Nagar area, where Qureshi was frequently spotted. Sanjay Kumar, the commissioner of police for Navi Mumbai, was among the local police personnel dressed in civilian clothes. Kumar noted Qureshi's tilt movement when he was brought next to him, and the forensics lab received a sample of his blood. After spending 40 lakh rupees on 880 tests, the forensics lab responded with a smile and "Test no. 881 was a match" when another sample was submitted. This case is similar to the serial killer Colin Pitchfork case, which was the first in the world to use DNA testing.

The Mumbai case demonstrates how prolonged investigations without forensic precision can risk violating the rights of both victims and accused. Once DNA evidence conclusively identified the perpetrator, it restored faith in justice and prevented arbitrary suspicion of innocent individuals.

Case Study Five Neeraj Grover Murder case

Neeraj Grover was a television executive who worked for Synergy Adlabs, a production company based in Mumbai. He assisted Maria Susairaj in 2008 as she made her mark in

the motion picture industry. Maria was seeing Lieutenant Emil Jerome Mathew, with whom she was engaged to be married in two months.

Neeraj Grover disappeared on May 6, 2008, after going to see Maria. When Neeraj failed to return home for a full day that day, his parents reported him missing. Susairaj was questioned by police after they suspected her of being involved in the incident, but she steadfastly denied knowing Neeraj Grover's location. She persisted in telling the same lie for eight or ten days before coming to terms with the fact that her lover, Mathew, had killed him in front of her. She reported to the authorities that Neeraj Grover was fatally stabbed by his boyfriend, who, in the heat of the moment, observed Neeraj with Maria in a compromising position. Following the murder, they dismembered his body into 300 pieces so that it would fit in a suitcase. They then drove his friend Santro's car to the outskirts of Mumbai, where they burned the body and dumped it.

It was insufficient, though, as further proof was needed to connect them to the crime. The Forensics lab was therefore asked to compare the evidence. When there were no eyewitnesses, forensics was crucial in helping to convict the perpetrators. The fact that the forensic scientific officer was called upon more than twenty times in court to disclose the process employed in the assessment of evidence indicates the reliance on forensics examination.

The official told the court that they were able to collect DNA samples from washed bloodstains and though the charred bones of Neeraj were insufficient to identify him but three teeth, femur bones, and some other residue that was collected so as to extract the DNA sample matched positively with his parent’s DNA. In addition, forensic analysis was used to compare the mud extracted from the tyre treads with the secondary crime scene—where the body parts were discovered—to establish a connection. The mud samples from the location where Neeraj's body was disposed of and the mud traces matched as well.

In this case, forensic science not only secured conviction but also ensured that gruesome human rights violations like dismemberment and concealment of a body were fully exposed. The case illustrates the role of forensics in upholding both the right to truth and the right of families to closure.

Case Study Six

Nirbhaya case: Delhi gang rape – 2013.

Forensic odontology, a relatively new science in India is already showing to be quite useful in both criminal and civil matters. Nirbhaya, a twenty-three-year-old woman, was raped many times aboard a private bus in Delhi, India on December 16, 2012. She had a male companion with her. She died on December 29, 2012, because of the terrible injuries she sustained in the violent attack. In a day, the suspects were located. Six males, one of whom was a minor, were convicted guilty. The accused's dental models were compared to the several bite marks found on the victim's corpse. Dr. Ashit B. Acharya (secretary of the Indian Association of Forensic Odontology and an associate professor at SDM College of Dental Sciences and Hospital in Dharwad) used computer software to evaluate the bite marks and hypothesized that two of the bite marks belonged to the same suspect. On May 6, 2013, the court approved the evidence that was

submitted. During his trial, one of the defendants committed suicide; the young person receiving the penalty was imprisoned for three years. The death penalty was applicable to the other four adults.

The Nirbhaya case is a turning point where forensic odontology and DNA evidence upheld the rights of a victim against systemic violence. By providing irrefutable evidence, forensic science became a voice for the silenced, advancing women's rights and strengthening public confidence in justice.

Forensic Science in Addressing Human Rights Violations

While much of the discussion has centered on gruesome crimes, it is equally important to examine how forensic science addresses gross human rights violations. Globally, forensic teams have been central in uncovering mass graves, documenting torture, and identifying victims of enforced disappearances. In Argentina, forensic anthropologists helped families of the desaparecidos trace missing persons and prosecute state perpetrators. In Rwanda and the former Yugoslavia, forensic experts under the ICTR and ICTY meticulously documented genocide and crimes against humanity, ensuring accountability before international tribunals.

In India, too, forensic science has been significant in investigating custodial deaths, extrajudicial encounters, and riot-related mass violence. Reports by the National Human Rights Commission (2020) stress that proper forensic examination prevents impunity in such cases by ensuring that deaths in custody or disappearances are investigated with scientific rigour rather than dismissed. By focusing on impartial evidence, forensic science curtails abuse of power and strengthens the constitutional mandate of protecting fundamental rights.

Therefore, forensic science must be viewed not merely as a criminal investigative tool but as a safeguard against state and non-state violations of human dignity. It embodies the principle that justice requires truth, and truth can only be established when science replaces speculation and coercion.

Conclusion & Recommendations

The human brain is a repository of knowledge that includes every bit of information regarding crimes as well as good and bad things that people have done. As a result, if we have access to this data, we can prove their culpability and the role they played in a certain conduct. Thus, the forensic science can be utilized as an instrument to established Mens Rea and Actus Rea of the accused. Mens rea means to have "a guilty mind." The rule's justification is that it is unfair for society to penalise people who damage others without intent. Actus reus literally means "guilty act," and generally refers to an overt act in furtherance of a crime. *It can also save money, time, strength as well as, it can protect human rights by avoiding long, harsh, inhuman methods of proving guilt.*

By implementing forensic procedures and techniques, the ability of law enforcement to solve crimes has greatly grown in the modern era. These days, a crime can frequently be solved with a careful examination of the crime scene and forensic evidence. Forensic scientists' work is crucial not just for criminal investigations and prosecutions but also

for civil disputes, major natural and man-made disasters, and the investigation of international crimes. The basis for the analysis of forensic evidence is a system that places a premium on collaboration, state-of-the art investigative skills and instruments (such as GPS positioning, cell phone tracking, video image analysis, artificial intelligence, and data mining), and the ability to appropriately process a crime scene by locating, obtaining, and conserving all relevant physical evidence.

Establishing a link between forensics, AI, and high-tech crime Inter-disciplinary intelligent forensics utilises technical advancements and employs resources in a more intelligent approach to resolve or assist in an investigation. Computers have immediate, significant, and lasting social and ethical repercussions. The outcomes of the development of artificial intelligence, multimedia, and robotics brought about the biggest changes in daily life. However, it's equally crucial to comprehend all the potential risk factors like privacy invasion and the challenges of maintaining security information.

The rising backlog in forensic labs, which causes trial court cases to swell and convicts awaiting trial to sulk in cells. Recommendations by National Human Rights Commission of India in the webinar on forensic science conducted on 11th August 2020 are worth mentioning here **-**

- It is necessary to establish consistency under a Standard Operating Procedure for performing forensic examinations;
- To fill all open positions in forensic science laboratories and to equip them with the necessary resources and facilities.
- Introduce forensic law studies as a separate course curriculum in integrated BSc (Forensic) LLB; Introduce forensic study and training in MBBS courses.
- Increase the number of forensic labs in proportion to the number of cases to be examined to prevent delays in the administration of justice;
- Create the position of District Medico-Legal Expert; professionalize post-mortem photography and videography; Make post-mortem a crucial activity for medical professionals; advise doctors properly regarding medico-legal procedures;
- To ensure the protection of women, it would be important to boost the collection of digital forensic evidence. Mortuary setup needs to be improved with the right equipment and environment to enable conduct of post-mortem.
- To facilitate forensic investigation of such cases, sexual assault kits need to be made available to all forensic labs.
- Coordination between investigators and prosecutors is crucial when using results from these systems. The two agencies might work together to organise the arrest and legal action. Early collaboration on these situations has increased both agencies' efficacy. Due to the increasing reliance on forensic evidence and the dynamic way that crime patterns are changing because of the rise in cybercrime, it is urgently necessary to fill open positions in forensic laboratories to reduce backlog and provide for training. The judiciary and investigating agencies must be aware of the general procedures and principles followed in forensics when gathering and examining the physical evidence from the scene of the incident. Forensic Examination is very

important evidence in the criminal justice system for successful administration of justice. Additionally, there is a need to raise awareness among the media and public about the need to avoid disclosing private information or methods that can obstruct an investigation or legal proceedings.

In conclusion, forensic science serves as a bridge between criminal justice and human rights protection. It prevents miscarriages of justice, ensures that the guilty are punished while the innocent are protected, and strengthens accountability for both individual and state perpetrated crimes. Expanding forensic capacities, integrating rights-based training for investigators, and fostering international collaboration will ensure that science continues to serve justice while safeguarding fundamental rights. Thus, the role of forensic science is not only technical but profoundly ethical, as it protects the very foundation of human dignity and justice.

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