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CRITICAL ANALYSIS OF ROLE OF FORENSIC SCIENCE IN INVESTIGATION OF SEXUAL OFFENCE

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ABSTRACT

This research paper critically analyzes the role of forensic science in investigating sexual offenses, focusing on rape cases, by contrasting its theoretical potential with empirical limitations. Sexual offenses pose a profound global challenge, with millions of reported incidents yearly yet conviction rates languishing at 23-28% in regions like India, largely due to evidentiary shortcomings and high attrition rates. Forensic science provides indispensable objective evidence, including biological samples (semen, DNA from vaginal/anal/oral swabs via STR and Y-STR profiling, saliva), trace materials (hairs, fibers, toxicology for drug-facilitated assaults), and injury patterns (genital trauma, bruising, petechiae).nij.ojp+1

The study delineates forensic protocols: Sexual Assault Evidence Collection Kits (SAECK) administered by trained Sexual Assault Nurse Examiners (SANE) within 72-96 hours to preserve fleeting biological traces against degradation from victim hygiene or delays. It covers investigation phases—victim medical exams, crime scene processing, chain-of-custody lab analyses (PCR amplification), and non-DNA integration, where injuries alone can increase arrest odds fourfold. Empirical insights from the National Institute of Justice's 602-case study reveal DNA yields of 37-47%, but real-world barriers like untested kit backlogs (over 100,000 in the U.S.), contamination, and interpretive biases erode prosecutorial impact.cfrc.illinois+1

Case analyses highlight successes, such as familial DNA matches in cold cases, contrasted with failures from post-assault showers dropping recovery below 20%. Regional disparities, especially in resource-poor settings, amplify challenges like lab overloads and victim reluctance. The paper employs outcome tables to compare DNA versus non-DNA evidentiary value across victim demographics and offense types.

It advocates reforms: enhanced SANE training, rapid DNA tech, backlog clearance funding, and victim-centered policies fusing forensics with judicial processes. Forensic science, thus positioned as a justice catalyst, demands systemic evolution to fulfill its promise against sexual violence.

Keywords: *Forensic science, sexual offenses, rape investigations, DNA profiling, Y-STR, SANE protocols, evidentiary attrition, conviction rates, chain-of-custody, non-DNA evidence, toxicology, crime scene forensics.*

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INTRODUCTION:

Sexual offenses are the most inhuman activities done by humans. Sexual offenses are generally viewed as a serious assault on the body; mainly genital molestation occurs without the victim's consent. Even if it is a physical assault, the victim's self-respect, dignity, and modesty are violated. In the broader sense, sexual offenses are acts or expressions of violence and falsification committed by the most powerful male against the weakest available females in secure situations as a result of emotions such as anger, sorrow, self- doubt, annoyance, hostility, and deprivation, as well as the innocence of their true identity as SAT, CHITT, and ANANDA.

The inhuman Nirbhaya Rape case shook the world to its spine, the brutality of the act committed came to light through the forensic reports. Four criminals' fates were sealed by scientific and forensic evidence such as DNA, finer prints, and bite mark analysis. Through line of years witnessing daily soaps like CID and the amazing talent represented through forensic tests and solving cases in minutes, puts every mind into thinking whether the Forensic science plays a vital role in solving cases? One of the key reasons for the low conviction rate is the lack of uniform guidelines for acquiring medical evidence in rape cases. Forensic-science is implementation of knowledge of science and techniques to the practice and application of law. In civil and crime related circumstances, forensic-analysis is employed in the investigation and prosecution. It helps in determining the guilt or guiltlessness of the individual. It's basic agenda revolves around advising people doing the criminal investigations and to produce reliable information to courts for case resolution. "Forensic science" is an excellent moniker for the work of a scientist who, through reports and testimony, answers questions for the courts. As a result, forensic science is the science used in legal procedures. Forensic science is described by the National Institute of Justice (NIJ, 1908) as "the application of scientific knowledge to the legal system." It can be defined more broadly as a scientific field devoted to the recognition, identification, individualization, and evaluation of physical evidence using natural science concepts and processes for criminal justice administration.[271]

Criminal investigation involves collecting evidence of a crime, attempting to discover the truth, and providing the perpetrator's legal evidence link to the crime. This process should establish beyond reasonable doubt that: crime has been committed. The corpus deliciti has been found, The offender had the chance to commit a criminal act, as well as the motivation to do so. The accused used a specific Modus Operandi.[272]

Importance of "Forensic-evidence"

Forensic-science is a inseparable part of every judicial system as it delivers right information by studying the evidences collected and determines the true identity of the wrong doer with the help of identifying personal traits of such individual like, fingerprints, footprints, blood drops or hair.[273]

Forensic-science caters everything that helps in the collection, perputation, and detailed anaylsis of that collected evidence, such as identification by DNA- Analysis, study of molecular build up and its growth over the time, and explosive analysis and identification

Science is increasingly helping the investigators in carrying out various tasks involved in the investigation. In fact the societal sea change has made and is making the scientific methods of investigation indispensable. They are not costly vis-à-vis the results. The administrators of law have realized their importance and they are made available, as there are no better alternative options available. It establishes a link

[271] Modi, A textbook of Medical Jurisprudence and Toxicology, 381, Lexis Nexis, 26thedition
[272] B.R. Sharma, Scientific Criminal Investigation,2,Lexis Nexis, 5th edition 2015
[273] Modi, A textbook on Medical Jurisprudence and Toxicology,382,Lexix Nexis, 26th Edition.

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between the perpetrator to the alleged offence by the way of elements left at the site of occurrence and with that of the one against whom the alleged act was committed. Contrary if the final result of analysis does not establish any link between the site of occurrence and that of the victim with the accused, his righteousness gets established. Thus forensic science not only helps in indentifying the culprit but also saved the innocent person.

Forensic analysis describes the characteristics of person on whom the suspicion of crime lies. The evidence reveals the nature of the crime. The situation explains the occurrence's timing. The crime scene is proven by forensic evidence. The offender's method of operation is discovered through forensic investigation. Finally, it establishes the crime's intention. The process of forensic investigation starts from the time when evidence is collected at the site of occurrence or from the person against whom crime is committed, further it is studied in labs and the last step is producing the end results before magistrate. Following introduction of the DNA analysis as a importance identification mechanism, the same provided investigators with a substantial amount of knowledge that enables them to locate the suspect.

The turning point in the brutal Delhi gang rape case was forensic evidence. The key evidences were the fingerprints and bite marks of the four people. "In this case, the court, made up of Judges R Banumathi and Ashok Bhushan, said, DNA technology has not only guided the investigation, but also provided the court with information on the prone features of criminal identification, and such evidence has been increasingly relied upon by the courts." [274]

The brutality of the act was established only through the post mortem report received which shook the world to its spine which also forms a part of forensic technique. In sexual offence cases both the culprit and the victim carry vital evidence. They are lost with the passage of time. Their medico-legal examination should, therefore be carried out at the earliest. Forensic technological-based movies and dramas are exciting and speedy-paced. But in fact, it's far absolutely unique. The method is prolonged and has an excessive danger of destroying the proof.[275]

As the technology is advancing and inventions in sciences are reaching sky heights is right to say that there is rather no shortage of experienced personas and scholars in this sea of forensic science, but the quality of the work is different and will significantly affect it for the following reasons:-

1. Absence of well equipped labs.
2. No compulsory certification for practicing experts
3. Insufficiency of advanced study and modern technique
4. Absence of quality future prospect.
5. No effective training for experts.

The accountability of forensic evidence is questioned due to conflicting practices in criminal laboratories, non-commercial practitioners, providing evidence of fraud and lack of quality control of the evidences. The validity of every forensic evidence fails to be established if it is not backed by a strong foundation of scientific reasoning. The credibility of every forensic evidence is questioned on the basis of the facts and circumstances of cases. The major question left to be addressed in the court is the admissibility of such evidences.

LAWS OF MEDICAL FORENSIC REPORTS:

Section 375 of the Indian Penal Code deals with the offense of rape. It defines rape as "sexual relations with a woman against her will, without her consent, by force, misinformation, or fraudulence or at a time when she has been fuddled or duped or is of unsound mental health and in any case if she is under 18 years of age." Other important provisions related to rape in the Indian Evidence Act, of 1872, are in section

[274] 4 (2017) 6 SCC 1

[275] B.R. Sharma Scientific Criminal Investigation, 15 Lexix Nexis 2nd edition

45, which deals with medical and forensic practitioners as competent witnesses. Courts depend on toxicological results, DNA inspections, and specialist judgments about offenses, and Section 114(A) deals with the court presuming that the victim of rape did not consent it if she claims not to have given her consent. This provision strengthens the forensic findings and evidentiary advantage in showing non-consensual activity. Dying declarations, including those written by medical practitioners, are substantive proof under section 32(1). The medical examination of a rape victim is governed by Sections 164A and 53A(1) of the Criminal Procedure Code 1973, specifying that a medical expert must examine a specific accused of rape. The most important factor is the accordance with such an examination under this section. The court determines section 293, authorizing forensic results from government laboratories to be admitted as evidence without the practitioner's presence in the court. Section 27 of the Protection of Children from Sexual Offenses (POCSO) Act 2012 deals with the requirement that the most sensitive forensic medical examinations be executed on juvenile victims, preferably by a female medical practitioner, and Section 36 mandates that forensic and medical analysis be managed in a child-friendly manner. The Indian Medical Council Regulation, 2002, provides principles and standards for conducting medical examination in cases of sexual offenses while supporting confidentiality and informed consent.

FORENSIC SCIENCE EVIDENCE: A NEWLY INVOLVED TECHNIQUE:

The application of specific range of scientific knowledge to address issues and further the ends of justice in a judicial system is known as forensic science. It process to identify and compare the materials. It establishes whether there is a connection between the crime, the victims, the perpetrators, the weapons used in the offense, the place, and the time of the happenings. It incorporates all scientific disciplines and uses them to further the purpose of law. There are 2 types of medical forensic reports for sexual offenses:

1. DNA Test.

2. Osteoporosis/ Bone Density Test

DNA TEST

DNA fingerprinting is a technique that helps scientists and legal experts identify and solve crimes. Forensic medicine repeatedly uses DNA analysis to identify human remains, paternity tests, and examine elements seized at crime scenes. It is such a sensitive a test that even a sample can be used to link a suspect to a crime scene. The ability to recover genetic information from the contents of a small number of cells, DNA profiling has become one of the most important forensic zones. In forensic medicine, it is the most important event of the late 20th century.

OSTEOPOROSIS/BONE DENSITY TEST A bone density test specifies whether you have osteoporosis, a disorder identified by bones that are more brittle and more likely to break. The test measures the grams of calcium and other bone minerals that are packed into a bone segment using X-rays. The bones that are most frequently tested are in the hip, spine, and occasionally the forearm.

MEDICAL FORENSIC REPORTS Medical forensic reports play very critical dual roles in cases of sexual offenses, specifically in rape cases. Providing the required medical treatment and psychological support is the first step. The second is to assist the survivors in the medical-legal proceedings by gathering the necessary evidence and correctly documenting it. Hence, the medical forensic reports so prepared become all the more important. Forensic reports are one approach to help find out the facts because there are usually no eyewitnesses of the act, and the victim and accused usually speak purely in their own interests. Forensic examination of the victim has always been a mandatory requirement. If the other evidence in the case is reasonable, the unsuccessfulness of the medical report is not

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fatal. In the state of Madhya Pradesh v. Dayal Sahu, the Supreme Court held that the appellate court cannot refuse guilt based on conclusions drawn from based on irrelevant facts. The accused will not be given the benefit of the doubt for not inquiring about the prosecution's doctor if the victim's and other witnesses evidence is deemed credible.

Admissibility of Forensic Evidences Rape is a criminal offense and now not a scientific prognosis by means of the paramedic treating the sufferer.[276]

Therefore, the problem of whether rape happened is a felony consequence, not a scientific one.It is an accusation made through the investigative officer upon the victim's grievance. The only explanation the paramedic can provide is whether there is evidence of recent sexual activity and whether there are bite marks on any part of the body or noticeable injuries in and around intimate areas. Their job is primarily to provide adequate health care and comfort to the victim and secondarily to assist the prosecution with appropriate medical evidence.[277]

The question of the validity of the evidence is often raised about some evidence that seems insignificant but something related to the facts in the matter, where distortion as needed to link to the conclusion of the truth. India to in recent decades, with the development of new scientific technologies, the focus must be on research and understanding applications that promote the use of forensic evidence. This brought about a change in point of view from mystic to scientifically clear not only in criminal investigation but in the various fields of the legal system. On many footings the value and credibility of forensic evidence is challenged before the court of law. The key ground for this is that if any mistake or mistake is made on behalf of forensic scientists, it will change everything. Fingerprints, which can be seen with blood stains, were detected at the crime scene. But nowadays technology has become more advanced with the help of hidden fingerprints and other modern techniques.[278]

There is confusion as to whether forensic evidence should only be considered confirmatory evidences. This fact is directly dependent on every case to case basis as the facts of each case stands unique, but why forensic evidence is accepted as corroborating or circumstantial evidence is that there was no eyewitness at the time of the incident and therefore they accepted the incident as natural evidence. One of the most important legal issues is the "Right against Self-Incrimination," which is guaranteed by "Article 20(3)" of the Indian Constitution[279] and forbids an accused person from testifying against himself or herself in criminal situations. The fundamental right guaranteed by Article 20(3) protects persons accused of crimes who are forced to testify against themselves from testimonial pressure. The protection is offered not only for evidence submitted in a court trial, but also for evidence given prior to the trial if the individual is charged at the time the statement is made. Article 20(3), on the other hand, only protects against self-incrimination when compulsion is used, not when a voluntary statement, revelation, or production of a document or other information is made. False detector test , polytrophic tests, DNA tests shall only be conducted with consent, and the same cannot be conducted by use of force.Art. 20 (3) is concerned with the principle against self-crimination meaning "No one is accused of any the case will have to be a witness against him". "No one should be coerced into any of these techniques in criminal proceedings, investigative or otherwise. To do so is an unjustified intrusion into personal liberty".[280]

Third point to consider is the real evidential value. DNA is not regarded absolute proof, but rather a professional opinion that can be used

[276] Madam Gopal Kakkad v. Naval Dubey and Anr, 1992 SCR (2) 921.
[277] Modi, A Textbook of Medical Jurisprudence and Toxicology, 766, Lexis Nexis, 26th Edition
[278] Jennifer L. Monookint, "The Courts and Future of Forensic Science".
[279] Constitution of India, 1950
[280] Selvi v. State of Karnataka, 2010(7) SCC 263

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to support other evidence. According to the Indian Evidence Act of 1872, expert opinion must be relevant and admissible. "An expert is someone who has dedicated time and study to a specific field of expertise and is thus especially knowledgeable on the topics on which he is asked to remark." There are no regulatory rules establishing how much experience or qualification a person must have in order to be deemed an expert. Evidence presented by an expert is purely speculation and not factual evidence and is therefore limited. For this reason, eyewitnesses or other witnesses of the truth preclude expert opinion. This is because the evidence for the theories cannot be substantiated. It has been accepted since long time that the knowledge of medicine and human body is a matter of science and hence courts have treated expert medical opinion with respect. In spite of that, a medical man cannot be allowed to give his opinion on the matters which are within the province of the court to decide. Indeed it is expected of law courts that they would not surrender their will, independence or judgment to an expert and would in all cases in which evidence is adduced before it, after giving it such weight as they may think it deserves , make up their own mind upon an issue in respect of which the expert testimony has been given.[281]

However, the value of the evidence for an expert opinion depends on the facts and circumstances. For example, a medical professional's DNA report is extremely important in the event of a dispute over the identity of a parent.

TYPES OF FORENSIC EVIDENCES

1) DNA Analysis

One of the most reliable types of evidence in many criminal cases is our genetically engineered DNA (deoxyribonucleic acid). The internationally accepted basic theory of DNA analysis is that everyone (except the same twin) has some unique traits in their DNA (deoxyribonucleic acid, which make up chromosomes).[282]At each stage of human development, all cells forming the body contain the same DNA- half from the father and half from the mother. This fact allows the identification of the relationships.[283] The technology of DNA is widely used in solving crimes in many ways. In instances where the suspected individual's identity is already in light, the DNA samples collected from that individuals are directly used to link the with the samples collected at the site of occurrence. This comparison can help determine whether the suspect committed the crime. On the other hand where the suspected individual's identity is still in dark and not confirmed, biological pieces of evidences collected from the site after detailed study and comparing the same with the samples available in the DNA region provides a greater aid in identification and investigation. It is a established fact that only DNA evidences is not enough to bring conviction on table, but DNA recording has become golden benchmark in scientific intelligence. On the present day, researchers are able to find DNA profiles from skin cells from left over when the culprit has touched the area. This enhanced sensitivity, combined with new data analysis methods, allowed the researchers to identify and isolate more people from DNA in a mixed sample. Identification of semen and linking the semen to the suspect is crucial in sexual offences. The DNA profiling of semen provides the real proof for the definite identification and linkage.

2) Semen Analysis

Sperm detection can be an important factor in confirming sexual abuse in rape cases. A large number of cases found in the law lab involve sexual crimes, and that is how the case is built. The investigation of offences involving semen needs delicate handling especially in rape and child abuse cases. Semen is easily destroyed.

[281] Vinod Kumar v, State of Haryana , 1987 Cr LJ 1541.

[282] B.R. Sharma, Scientific Criminal Investigation, 56, Lexix Nexis, 2nd Edition.

[283] B.R. Sharma, Scientific Criminal Investigation 57, Lexix, Nexis, 2nd Edition

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The evidence therefore needs prompt collection and preservation.[284]

Semen is a complex mixture of proteins, including blood group factors, choline, acid phosphatase, uric acid, inorganic salts, etc. the composition varies from person to person and with time, food and environment.[285]

It is important to check for signs of the presence of sperm spots. Microscopic sperm examination is a confirmation test in forensic serology to determine if it is sperm or not. Experiments performed by a specialist follow the rules and accordingly, tests are possible. Collected samples are first sealed and sent to the intelligence lab. Sample slides are edited and viewed under a microscope. For forensic purposes, sperm formation can be easily reduced to two parts, seminal fluid, and spermatozoa. Microscopically detecting spermatozoa is a complete indication that sperm are present in the object. The discovery of sperm samples in cases of sexual abuse supports accusations of sexual misconduct contact and indicates of DNA in the male source. The techniques used should ideally be highly sensitive and clear, as well as fairly consistent with standard DNA type procedures. Semen (sperm suspended in semen) is rarely found in the oral, anorectal, and vaginal canals six, twenty-four, and seventy-two hours after intercourse. The half-life in the vaginal cavity varies with the age of the victim (before or after puberty) and can be much longer than 72 hours if semen is localized in the cervix. In post pubertal girls, spermatozoa can remain mobile for 6-12 hours in vaginal secretions and up to 5 days in the cervix. Immobile spermatozoa can be detected in the vaginal discharge spots between 12 and 48 hours after ejaculation. Due to the absence of cervical mucus, the half-life of sperm in pre pubertal girls is quite short. Dry preferences in clothes are fairly stable, so sperm can be discovered for more than a year.[286]

3) Hair Analysis

Humans, including the criminals shed hair all the time. Thus while committing crimes, criminals leave hair at the scene, on the victim or on the articles which he comes in contact, on victim. The hair is therefore almost ever present clues in almost all types of crimes. They are tiny almost invisible. They need greater inputs and expertise to locate, collect and handle them.[287].

The labs use microscopic and macroscopic tests to differentiate hair from fibers and their specific sources, i.e. whether the material is of animal or human origin. After determining the source of the hair, the strand is identified. If it is determined to be human hair, labs proceed to determine the bodily origin of the hair strand, whether it came from the beard, genital area, or chest.[288]

Many cases have recently been overturned due to unjust convictions based on hair analysis, and it has become clear that while hair transfer may give connection evidence, blind reliance on any or all hair strands may lead to misunderstanding, errors, and wrongdoings. As a result of technological improvements, hair analysis has lost the value it formerly possessed and is no longer chosen to secure convictions or as essential evidence in court.

4) Bite Marks Analysis

For more than fifty years, bite mark analysis has been used to establish a link between the accused and the crime. Bite marks are more common in sex-related crimes, child abuse cases, and crimes involving physical confrontation such as murder. The premise that each person's dental structure is unique supports the identification of a suspect by matching teeth to a bite mark found in a crime victim.[289]

[284] B.R. Sharma, Scientific Criminal Investigation, 558, Lexis Nexis, 2nd Edition
[285] BR. Sharma, Scientific Criminal Investigation, 559, Lexis Nexis , 2nd Edition
[286] B.R.Sharma, Scientific Criminal Investigation, 559, Lexis Nexis 2nd edition.
[287] B.R. Sharma, Scientific Criminal Investigation, 566, Lexis Nexis 2nd edition.
[288] GM Roe,R.Cook & C North, "An evolution of An evolution of forensic hair examination". JFSS 31, 59-65 1991.
[289] Kavitha B, Einstein A, Sivapathasundharam B, Saraswathi TR. Limitations on forensic odontology. Forensic Dental Journal vol 1

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Face, lips, breasts, shoulder, neck, thigh, genitals, and testicles are commonly involved in sexual assaults. In linking crime, the anatomical position of the bite mark is always crucial. It is also critical to distinguish between attack injuries and defensive wounds. Bite marks with two separate arches are visible in the semi-circular injury. The bite mark will always be visible, along with a bruise in the centre. In this regard, bite mark comparisons follow the same logic as identifying a deceased individual. Although the courts have acknowledged this premise, the application varies significantly. Bite marks can never be used to exactly replicate the tooth features of the original.

. 5) Two Finger Test

The "two-finger test" or "virginity test" is performed under the mistaken belief that it can establish if a survivor has had vaginal intercourse and thus the reliability of her sexual assault account. The two-finger test is a regressive and unscientific process that includes inserting two fingers into a person's vagina to measure the suppleness of vaginal muscles and thereby assessing her 'virginity.' It is based on the patriarchal notion that a woman who is sexually active is less likely to have been sexually abused. The "virginity test," also known as a "per-vaginum examination," is used to determine whether or not the hymen is present and whether or not the vaginal muscles are loose. The test, however, is unscientific because the hymen can rupture for reasons other than sexual intercourse, such as playing sports, riding a bicycle, using tampons, and during medical procedures. "However, many people feel that the lack or rupture of hymen indicates that the woman was sexually active." It makes no difference if a person has previously engaged in sexual actions in cases of sexual assault. Second, there is no medical technique to determine whether a person is a sex habitual. In cases of sexual violence, the hymen should be treated like any other component of the genitals when documenting examination findings.[290]

With the judicial intervention this test has been held unethical but there are several instances where a rape survivor is still subjected to such inhuman acts.

JUDICIAL TRENDS

"Raj Kumar vs State of Uttar Pradesh"[291]

The case concerns the rape and murder of a young girl by her neighbor. This incidence came to light through brother of the deceased. The autopsy reports revealed that the girl was brutally raped. The genetic analysis report confirmed the same, and the Supreme Court debated the importance of DNA. The Supreme Court found that the DNA report played a key role in identifying the alleged perpetrator of the rape of the young girl. It stated that with the use of this modern techniques identification of suspects in the cases sexual is aiding in delivering justice.

"Santosh Kumar Singh vs State through CBI"[292]

Law student Priyadarshini was found raped and murdered in her home. When an autopsy was performed during the investigation and subsequently samples were also sent for DNA analysis, Hair, & to analyze bite mark. The autopsy report revealed that there was no committed. However, a DNA test confirms the rape of the victim. Collected hair samples are also genetically linked to the suspect. The Supreme Court has found that DNA evidence plays an important role in identifying the actual wrongdoer among other factual evidence. In a rape and murder case, if the rape is proven with DNA technology, the prosecutor can easily prove the murder case against the accused without hesitation.

"Vijay Kumar alias Bhushan v. NCT of Delhi"[293]

This was the most recent in a long line of cases in India concerning the acceptability of hair analysis. This case dealt thoroughly with all previous precedents and judgments of the

[290] Ministry of Health, Guidelines & Protocols,Medio-legal care for survivors/ victims of Sexual Violance,19th March 2014.
[291] (2014) 5 SCC353
[292] (2010) 9 SCC 747
[293] 2007(1) JCC 16

Supreme Court as well as other High Courts across India and laid down the law regarding hair analysis after taking into account the book of medical jurisprudence as well. The court concluded that medical jurisprudence can state microscopic study of the hair, whether the hair is the same or different colours or sizes, and that the examination may help in determining where the hair came from. It was also stated that while the science of hair identification is quite advanced and it may be possible to determine the source, it would not be safe to rely solely on the similarity of hair to convict an accused person; there must be some other connecting evidence to link the accused person with the crime, although hair analysis would be an important piece of evidence. As a result of a detailed examination of the instances involving hair as evidence, it is possible to conclude that, while hair strands constitute crucial evidence, utilising them as the criterion for criminal conviction has flaws. Its usage in drug analysis and paternity cases remains valid, but in criminal cases, standard operating procedures must be revised to allow hair to be the sole criterion for conviction.

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"Nirbhaya Case"[294]

The barbaric act of raping the victim in a bus in Delhi by 6 rapists on 16-12-2012.this judgment acts as one of the turning point in the history of criminal law. The nature and conduct of the rapists were inhumane that it revealed the most cruel side of human existence. The primary analysis revealed that her internal organs were totally damaged. There were several bite marks on her body, struggle marks were also visibly noted. DNA analysis and comparison of the semen in the vaginal swab and blood samples of the accused identified all the 6 rapists.

"Lilu @ Rajesh and Anr v. State of Haryana"[295]

The court had questioned the validity of the two-finger test for medical examination of a sexual abuse victim. In this case, rules are established for the doctor to follow when providing medical attention to the victim. Supreme court has clearly stated that the right of rape victims for the legal assistance does not mean they shall be forced to go through the same trauma again or their mental health or physical wellbeing should be disturbed at any instances. Upholding their integrity and dignity is the aim behind providing the right of legal aid. Medical help or aid provided to the rape survivors shall also entitle them the right of consent. The procedures shall not be conducted in a way that is brutal, dehumanising, or affecting the sanctity of human values and with respect to gender based offences the top most priority should always be given to health of the

[294] Mukesh & Anr. V. The state of NCT of Delhi & Ors,(2017) 6 SCC 1.
[295] (2013) 14 SCC 643

individual. Appropriate security measures should be implemented, and there should be no arbitrary or unlawful interference with their privacy. Without a doubt, the Court observed that the two-finger test and its perception violated the rights of rape survivors to privacy, bodily and mental integrity, and dignity. As a result, despite whatsoever the outcome of the test, this test can't imply a presumption of consent.

FINDINGS/CONCLUSION

Evidences are critical in determining guilt in any ideal criminal justice system. Evidence is used to establish beyond reasonable doubt that a said act has been committed or that a specific individual only has committed the alleged act.To prove anything means to remove any doubt about the truthfulness of the conclusion. The purpose of forensic evidence is to guide people conducting criminal investigations and to offer evidence on which the courts can make decisions. The significance of forensic evidence increases in cases of sexual offences such as rape, unnatural offences, and penetrative sexual assault with a kid. However, there is still a distinct approach, as these evidences are only handled as corroborative evidences. As criminals are adopting new current sophisticated tactics in committing crimes, it is no longer possible to solve the crime without using the new scientific approach. As a result, the importance of forensic science is rapidly growing in today's world. With the help of forensic science and its modern procedures, a mystery murder can be readily solved. With the passage of time, the breadth of forensic science expands. There are several fields of forensic science that are extremely useful in detecting, solving, and apprehending criminals. Forensic science still need technological progress. It also necessitates the use of criminal case experts who can safely collect evidence. The gap between the value of forensic evidences and that of the other evidences can only be met with the advancement of technology and its proper implementation. There is also need for proper guidelines to be framed for the process of collection and investigation of such evidences as the entire case depends on such evidences