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DNA TOUCH STR CODIS AS LEGITIMATE EVIDENCE IN UNCOVERING CRIMINAL ACTS

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Abstrak

Proses identifikasi di tempat kejadian perkara (TKP) merupakan salah satu hal yang mutlak harus dilakukan oleh penyidik kepolisian. Salah satu hal yang dapat ditemukan dan sebagai sumber unit analisis pembuktian yang sah di depan Undang-Undang adalah barang-barang yang ditemukan di TKP yang disebut dengan barang bukti (BB) karena dari BB yang ditemukan di TKP dapat diidentifikasi dan disimpulkan apakah suatu kejadian yang telah terjadi tersebut merupakan kejadian bunuh diri atau kejadian criminal lainnya (seperti pembunuhan, dan lainnya). BB yang ditemukan dapat dilakukan analisis dengan menggunakan pendekatan serobiologi molekuler yang saat ini tengah berkembang pesat di dunia kedokteran forensic dan medikolegal. Pendekatan yang dilakukan pada BB tersebut dapat berupa pendekatan dengan menggunakan DNA touch. Namun yang menjadi tantangan adalah seringkali DNA yang ditemukan di TKP adalah DNA yang tidak segar sehingga diperlukan metode system amplifikasi DNA dengan teknik Polymerase Chain Reaction (PCR) dan dengan menggunakan pendekatan identifikasi short tandem repeat (STR) – CODIS. Hasil analisis DNA touch dengan menggunakan pendekatan STR-CODIS akan menyimpulkan apakah kejadian tindak pidana yang ditemukan di TKP adalah murni tindak pidana, murni kejadian bunuh diri, atau murni kejadian kecelakaan lainnya yang terjadi pada korban. Selain itu, DNA touch STR CODIS dapat mengidentifikasi siapa korban yang ditemukan di TKP.

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***Kata Kunci**: DNA touch, STR-CODIS, Identifikasi, Tindak Pidana*

Abstract

The identification process at the crime scene (TKP) is one of the essential tasks carried out by police investigators. One critical aspect is the collection and analysis of evidence found at the crime scene, referred to as biological evidence (BB). This evidence serves as a crucial source for determining whether an incident occurred and, if so, whether it was a suicide or another criminal act (such as murder, etc.). The biological evidence found can be analyzed using molecular serobiology approaches, which are rapidly advancing in the fields of forensic medicine and medicolegal practice. One such approach involves utilizing DNA traces, although a common challenge is that often the DNA recovered at crime scenes is degraded. Therefore, a DNA amplification method utilizing the Polymerase Chain Reaction (PCR) technique, along with the short tandem repeat (STR) – CODIS identification approach, is necessary. The analysis of DNA traces using the STR-CODIS approach enables investigators to determine whether the incident was purely criminal, a suicide, or another type of accident involving the victim. Furthermore, the DNA analysis using the STR-CODIS method can also aid in identifying the victims discovered at the crime scene.

***Keywords**: Criminal act, DNA touch, Identification, STR-CODIS*

1. INTRODUCTION

The identification process is a method used to distinguish individuals by utilizing their unique characteristics, which may include traits of deceased victims, living individuals, or skeletons. This process is often associated with various cases, such as criminal investigations involving the identification of perpetrators of crimes such as murder, abuse, rape, etc. (Yudianto A, Sispitasri YA, and Margaret N, 2017). In recent times, the field of forensic medicine has experienced rapid development, marked by the emergence of innovative technological advancements and molecular-based discoveries. Significant progress has been made in the area of DNA-based molecular forensics (Deoxyribonucleic acid) (Rana AK, 2018). DNA, being the smallest unit present in all living organisms ranging from microorganisms to humans, animals, and plants, serves as a highly individualistic identifier. The identification process utilizing DNA is considered one of the most accurate methods of analysis, as the cells of an individual remain unchanged even after death. This fact was emphasized by Soekry in his inauguration speech as a professor at Airlangga University, referring to DNA's polymorphism and protein conservation (Soekry, 2004; Sankhla MS and Kumar R, 2017).

Moreover, DNA analysis is frequently employed to establish links between alleged perpetrators and criminal acts, as demonstrated in this paper through DNA touch analysis (Sowmyya T, 2016; Yudianto et al., 2020a, Yudianto et al., 2020b, Yudianto et al., 2020c). There are two types of DNA present in humans: nuclear DNA (nDNA) and mitochondrial DNA (mtDNA). The accuracy level of nDNA is higher than mtDNA, and the comparison material used typically involves genetic material from both parents. In contrast, mtDNA, which is found in the human body's cell structures lacking a nucleus, is inherited exclusively from the maternal lineage (Syukriani Y, 2012; Yudianto A, Sispitasri YA, and Margaret N, 2017; Yudianto et al., 2021a).

The analysis process using DNA varies and includes Variable Number of Tandem Repeat (VNTR), Restriction Fragment Length Polymorphisms (RFLP), and analysis via Short Tandem Repeat (STR). The basic principle of analysis in VNTR is based on the repetition of certain

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base sequences (core sequences), while the principle of analysis with STR focuses on examining the mini primers related to the mini primer for mtDNA in the hypervariable region 1 (HV1) or HV2 displacement loop (Yudianto A, 2010; Yudianto et al., 2021b). Examination of evidence found on the victim's body or at the crime scene (TKP) is one of the efforts made by forensic medicine to assist the investigation process. Perpetrators of crimes often do not realize that there may be contact between their skin or oral mucosa and surrounding objects, leaving traces of the object used to harm the victim (Williamson AL, 2012; Sowmyya T, 2016). However, it's important to note that not all DNA found at crime scene locations is fresh. Sometimes, damaged DNA conditions are discovered, necessitating the design of amplicon products that are shorter than those used for fresh DNA. Therefore, there is a need for mini STR primers capable of amplifying DNA using the Polymerase Chain Reaction (PCR) technique. The mini STR primer in question enables DNA detection using the STR Combined DNA Index System (CODIS) locus, with thirteen (13) types of CODIS currently recorded at the FBI (Yudianto A, 2010; Prastowo W and Listiana FD, 2014).

The position of evidence (corpus delicti) in the evidentiary system, according to the Criminal Procedure Code (KUHAP), falls within the category of additional evidence following witness statements, expert testimonies, documents, directives, and statements from the defendant. The evidence outlined in Article 197, paragraph (2), section d includes items and materials wherein the relationship between evidence and material is that the evidence serves to elucidate the connection between various elements in a criminal case. Evidence (corpus delicti) is defined as the entirety of facts demonstrating the commission of a crime, which encompasses physical evidence. The term 'corpus' in 'corpus delicti' refers to: 1. The body of a human or animal, 2. A collection of writings generally pertaining to one subject or by one author, thus indicating that 'corpus delicti' consists of facts pertaining to the commission of a crime, where these facts manifest as physical evidence. Examples of evidence in a criminal case include: 1. Objects utilized in the perpetration of a criminal act, 2. Items resulting from a criminal act, 3. Objects targeted by a criminal act, thereby establishing a very close link between the evidence and the offense or defendant.

There are several articles in the Criminal Procedure Code that mention the term or word 'evidence,' including: Article 5, paragraph (1), letter a, point 2: One of the authorities of investigators is to search for evidence. Article 8, paragraph (3), letter b: If the investigation is considered complete, the investigator hands over the responsibility for the suspect and evidence to the public prosecutor. Article 18, paragraph (2): In the case of someone caught red-handed, the arrest is carried out without a warrant, with the provision that the apprehender must immediately hand over the apprehended person and available evidence to the nearest investigator or assistant investigator. Article 21, paragraph (1): One of the reasons for detention necessity is if there are circumstances that give rise to concerns that the suspect or defendant will damage or destroy evidence.

Article 181, paragraph (1): The presiding judge at the trial shows the defendant all the evidence and asks if they recognize the object. Then, the presiding judge also shows the object to the witness. Article 194, paragraph (1): In the case of a verdict of conviction or acquittal or regardless of all legal demands, the court determines that the confiscated evidence be handed over to the party most entitled to receive it back, whose name is stated in the decision unless, according to the provisions of the law, the evidence must be confiscated for the benefit of the state or destroyed or damaged so that it cannot be used again. Article 203, paragraph (2): In a brief

examination, the public prosecutor confronts the defendant along with witnesses, experts, interpreters, and necessary evidence. The term 'evidence' is distinct from 'proof' explicitly stated in Article 183 of the Criminal Procedure Code, where it is stipulated that a judge may not convict a person unless, with at least two valid pieces of evidence, they are convinced that a criminal act indeed occurred and that the defendant is guilty of committing it. Evidence, as defined in Article 184, paragraph (1) of the Criminal Procedure Code, is limited to witness statements, expert testimonies, documents, directives, and statements from the defendant (Lokas, 2015).

In general, DNA extraction is successfully carried out from various biological sources such as blood, semen, saliva, buccal cell swabs, and skin cells. Typically, the primary choice for DNA examination is blood obtained through venous, arterial, and capillary blood specimens. However, this technique is invasive and can cause discomfort for the individual being examined. Additionally, the cost of blood-based DNA extraction is significant, making it a less feasible option. Moreover, blood collection techniques are impractical for collecting large quantities of samples (Emanuela DD, Dhanardhono T, and Saebani, 2017). To address the limitations of DNA extraction via blood, several alternative technologies are available, including DNA touch or contact trace DNA, and buccal swabs, which can aid in the identification process via DNA (Sankhla MS and Kumar R, 2017; Yudianto et al., 2022a).

One of the materials for identification purposes, and the main focus of discussion in this final assignment paper on Forensic Science, is the rope used in hanging cases. Currently, hanging is one of the most common methods of suicide. According to data from the National Crime Records Bureau (NCRB), MHA, and the Government of India, 60,952 people commit suicide by hanging, contributing to 45.6% of total suicide cases in India. A report by the World Health Organization (WHO) indicates that hanging is more prevalent among men than women, while more women opt for suicide by poisoning. Several studies suggest that hanging is more common for several reasons: 1. The fatality rate from hanging is 70%, 2. Materials used for hanging, such as rope or cloth, are readily available, 3. Hanging does not cause significant pain, and 4. Hanging provides a 70% certainty of death due to asphyxiation (Pal & Pratihari, 2017; Nath & Pratihari, 2018; Yudianto et al., 2022b).

Moreover, in Forensic Science, evidence must be meticulously established and proven to determine whether the deceased victim hanged themselves or was killed by strangulation. Although these two scenarios may initially seem similar, they are fundamentally different from one another. Verification must be conducted on the evidence (BB) discovered at the crime scene (TKP), particularly on the rope. Additionally, this paper explores other cases that can be resolved through DNA touch analysis. Given the aforementioned background, this journal aims to investigate the issue of 'DNA Touch STR CODIS as a Valid Evidence Effort in Court in Revealing an Incident of Alleged Crime.

2. RESEARCH METHOD

This type of research falls under normative juridical research. The normative juridical approach utilizes primary legal materials as a foundation, studying theories, concepts, and principles in legal science, as well as statutory regulations related to the research being conducted, in order to seek solutions to legal issues and identify the fundamental meanings of rights and obligations, legal events, legal relationships, and legal objects. This approach is also known as the bibliographic approach, which

involves reviewing books, laws and regulations, and other pertinent documents related to the research in a written and systematic manner (Efendi, 2018).

This legal research approach employs a statutory approach (Marzuki, 2005), which entails studying legal principles, legal norms, and statutory regulations. It also employs a conceptual approach, which involves identifying the essence of basic legal principles, legal subjects, rights and obligations, legal events, legal relationships, and legal objects.

This research involves legal materials categorized into primary legal materials, secondary legal materials, and tertiary legal materials. Primary legal materials are legally binding materials encompassing legislation, official records, or minutes involved in legislation drafting and judicial decisions. The primary legal materials pertinent to this research include:

a. Article 197, paragraph (1) of the Criminal Procedure Code (KUHAP),
b. Article 5, paragraph (1), letter a, point 2 of the Criminal Procedure Code (KUHAP),
c. Article 8, paragraph (3), letter b of the Criminal Procedure Code (KUHAP),
d. Article 18, paragraph (2) of the Criminal Procedure Code (KUHAP),
e. Article 21, paragraph (1) of the Criminal Procedure Code (KUHAP),
f. Article 181, paragraph (1) of the Criminal Procedure Code (KUHAP),
g. Article 194, paragraph (1) of the Criminal Procedure Code (KUHAP),
h. Article 203, paragraph (2) of the Criminal Procedure Code (KUHAP),
i. Article 184, paragraph 1 of the Criminal Procedure Code (KUHAP),
j. Article 183 of the Criminal Procedure Code (KUHAP).

Secondary legal materials comprise all publications on law apart from official documents. These include textbooks, legal dictionaries, legal journals, and court commentaries or decisions. Among these, textbooks are considered the primary secondary legal materials as they contain fundamental principles of legal science and high-quality classical scholars' perspectives.

Tertiary legal materials are additional resources to elucidate aspects related to the materials under study. These materials encompass non-legal resources that provide complementary assistance, such as dictionaries, encyclopedias, and others relevant to this research.

The process of collecting legal materials involves several steps: reading, studying, quoting, comparing, and connecting legal materials from legislation and literature to form a cohesive unit for easier processing. The processing of legal materials entails the following stages:

a. Editing, which involves meticulously checking legal materials to ensure there are no errors in the collected data.
b. Classification, which entails categorizing the collected data based on each subject to prevent errors in grouping.
c. Organizing, which involves sorting the collected legal materials systematically to avoid significant errors in accordance with the systematization of the materials.

Once all data has been collected and processed systematically, it undergoes systematic analysis. The analytical method employed for legal materials in this research is the normative descriptive method, which does not utilize models measured or expressed with numbers or statistics, but rather relies on legal norms, rules, concepts, or doctrines found within the framework or literature review to address the research problems.

The legal materials gathered and obtained for research are then processed systematically and consistently, followed by analysis through a series of statements that describe the research results based on the

problem under study. The subsequent step involves conducting a theoretical analysis of these legal materials to explore, comprehend, and elucidate the significance of DNA touch as one of the legitimate evidentiary efforts in court to uncover incidents of alleged criminal activity

3. RESULTS AND DISCUSSION

Philosophical Foundations of Evidence at Crime Scenes (TKP)

All evidence found at the crime scene (TKP) can potentially serve as material for forensic DNA examination because they may contain cells, both nucleated and non-nucleated, which can be deposited through sweat or bodily tissues. Materials such as ropes, slaps, cloth, etc., commonly associated with hanging, are typically utilized as specimens. The DNA touch isolation process is conducted on these materials, followed by analysis using the Polymerase Chain Reaction (PCR)-Combined DNA Index System (CODIS)-Short Tandem Repeat (STR) method.

Subsequently, comparison of the DNA from the hanging material with that of the victim is essential. If the DNA profiles match, it can be inferred and substantiated that the victim committed suicide. However, if the DNA profiles differ, and other analyses suggest discrepancies, it may indicate that the victim was not a suicide but rather a victim of murder (Yudianto et al., 2020c).

DNA touch refers to DNA that remains and is shed from skin cells when someone touches or comes into contact with an object. DNA touch technology has been widely utilized in investigating various criminal cases, such as murders involving tools used to harm victims. Although DNA touch on the tool or material may not be visible to the naked eye, swabbing processes on evidence are necessary for detection. Williamson AL (2011) noted in his journal that DNA touch analysis can be instrumental in uncovering various crime-related cases. For instance, a case of assault on a woman by a man was revealed through swab analysis of the material used for beating, namely a leather belt. This finding is supported by the research conducted by Daly et al. (2011), who surveyed 300 respondents asked to handle objects made of glass, fabric, and wood, yielding diverse results and enabling pattern analysis on DNA touch (Daly et al., 2011; Williamson AL, 2011; Puspa et al., 2021).

The Urgency of DNA Touch as Evidence (BB) at the Crime Scene (TKP)

The DNA touch left behind at a crime scene may consist of mitochondrial DNA (mtDNA) and/or nuclear DNA (nuDNA). Soekry Erfan Kusuma, in his inaugural speech as a professor at Airlangga University for Forensic Sciences, highlighted that DNA, particularly DNA touch, exhibits protein polymorphism properties, which are enduring, testable, and transferrable. DNA touch can serve as admissible evidence in court proceedings, particularly in cases involving hanging, as individuals typically grasp the material used for hanging around their necks. The grip marks left behind can be identified and isolated through DNA touch analysis, as DNA touch primarily originates from the hands.

Human skin sheds similarly to snake skin, with a turnover period of approximately 27.8 days. Additionally, sweat glands in the skin secrete sweat, which, as indicated in Yudianto's thesis, can be utilized in forensic identification processes (Soekry, 2004; Yudianto, 2006). The collected material can be analyzed using the Short Tandem Repeat (STR) technique, amplified through Polymerase Chain Reaction (PCR). Selection of the appropriate loci for analysis can be based on the Combined DNA Index System (CODIS), which comprises 28 loci. CODIS, managed

by the Federal Bureau of Investigation (FBI), includes loci such as D3S1358, TH01, D21S11, D18S51, Penta E, D5S818, D13S317, D7S820, D16S539, CSF1PO, Penta D, VWA, D8S1179, TPOX, FGA, D19S433, D2S1338, D22S1045, D1S1656, D10S1248, D2S441, D12S391, SE33, LPL, F13B, FESFPS, F13A01, and Penta C. Several studies have demonstrated the applicability of CODIS in analyzing hanging cases using DNA touch in Indonesia, particularly on the island of Java (Soekry EF, 2004; Yudianto, 2006; Koesbardiati et al., 2013; Abbas et al., 2018; Sosiawan et al., 2019).

The STR technique is closely associated with the in vitro DNA amplification method, known as Polymerase Chain Reaction (PCR). PCR is a scientific technique in the field of molecular biology used to multiply one or several DNA chains through several stages, resulting in thousands or even millions of copies of the same DNA chain being copied. PCR serves various purposes, including amplifying nucleotide sequences, determining the nucleotide sequence condition of mutated DNA, forensic medicine applications, and tracing individual origins by comparing genetic "fingerprints". PCR comprises several essential components, including the DNA polymerase enzyme, primers, and various other reagents. The DNA polymerase enzyme typically used in PCR is Taq DNA polymerase, known for its activity and stability at high temperatures. Primers are short single-stranded oligonucleotides with a complementary sequence to the DNA template to be amplified, typically around 20-30 bases in length. Other reagents utilized in PCR include dNTPs (deoxynucleotide triphosphates) for the polymerization reaction and a buffer containing $MgCl_2$. The Mg^{2+} ions from the $MgCl_2$ buffer play a crucial role in various aspects of the PCR process, including primary annealing, denaturation, product specificity, enzyme activity, and reaction fidelity (Putri, 2015; Sulistyorini et al., 2020)

5. CONCLUSIONS AND SUGGESTIONS

Analyzing evidence is crucial in both medical and forensic science cases, such as hanging cases. Evidence found at the scene, such as on the rope or material used, can undergo examination to extract DNA touch present on the cloth or material used for hanging. The DNA touch from the hanging material is then analyzed using the Short Tandem Repeat (STR) technique instead of the Restriction Fragment Length Polymorphism (RFLP) method. This choice is made because RFLP analysis faces challenges due to degradation, which occurs in approximately 40% of forensic cases, making it difficult for analysis.

Following the extraction of touch DNA, PCR amplification is conducted using a PCR instrument. The amplified DNA can then be compared to determine whether the victim in the case report truly hanged themselves (suicide) or if foul play was involved. This comparison serves as a basis for forensic evidence, aiding in the determination of the cause of death.

While DNA touch analysis offers advantages in forensic investigations, such as providing valuable evidence, it also presents challenges. DNA touch samples are often obtained in small quantities and may experience degradation, leading to potential inaccuracies in analysis. Additionally, sample contamination can occur, further complicating accurate analysis. However, these challenges can be addressed during the analysis process. One approach to overcoming these challenges is by utilizing the Short Tandem Repeat mini primer technique in conjunction with PCR amplification using CODIS loci commonly found in Indonesia, particularly in Java. This technique enhances the sensitivity of DNA analysis, allowing for more accurate results even with limited or degraded samples.

In addition to DNA touch analysis, forensic analysis can also be conducted by examining ligature marks on the victim's neck. According to certain theories, the presence of straight marks on the neck, rather than marks pointing upwards, may indicate homicide. However, it's important to note that the interpretation of ligature marks is complex and may not always provide definitive conclusions. In the Indonesian legal system, which adheres to the Continental legal system, experts are considered passive and cannot conduct analyses without a written request from the investigator. However, experts may provide their opinions directly to the judge with a certificate, particularly regarding the identification between DNA touch on the hanging material and the victim's body. Requests from investigators must be channeled through them for consideration by the judge

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If there is, write an acknowledgement here.

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