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Medicolegal Aspects of Examination of Silent Witnesses in the Form of Bloodstains: A Narrative Literature Review

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1. Introduction

Crime is an act against the law. It seems in society, and we are now something that is no longer taboo and ordinary. This can be seen in the increasing number of news about crime in various media. Crime has become a subculture or a separate part of the culture in modern society, no longer just a deviation from social institutions. Forensic science has an important role in disclosing a crime that has occurred, especially in cases that are difficult to solve or require special techniques in disclosure.^{1,2} This literature review aimed to describe the examination of silent evidence in the form of bloodstains which are generally found at murder crime scenes.

ABSTRACT

Crime has become a subculture, or a separate part of the culture public modernity is no longer just a deviation of social institutions. With advances in science and technology, investigators and experts can search for evidence through scientific analysis. This literature review aimed to describe the examination of silent evidence in the form of bloodstains which are generally found at murder crime scenes. The most common bloodstains found at crime scenes are on the floor. This is due to the drops of blood that fall to the floor following the direction of the earth's gravitational force. There are several things that must be considered in observing blood spots, namely the color of the blood, the estimated volume, and the color of the floor where the blood drips. Examination methods developed by forensic researchers around the world in assessing bloodstains include using electron paramagnetic resonance (EPR), reflectance spectroscopy, and high-performance liquid chromatography (HPLC). In conclusion, the assessment of the color of the bloodstains as a silent witness can provide clues regarding the age of the bloodstains and the time of the crime.

Silent witnesses

Since time immemorial, humans have been looking for the best way to prove the truth and uphold justice.³ With advances in science and technology, investigators and experts can search for silent witnesses through scientific analysis.⁴ Examination of evidence (corpus delicti) requires the expertise of scientists so that the perpetrators of crimes can be determined. Because actually, every crime always leaves traces or evidence (silent witnesses).⁵ Silent witnesses consist of objects or human bodies that have experienced violence, weapons or tools used to commit crimes, traces left by the perpetrators at the crime scene, and objects carried by the perpetrators from the TKP.^{6,7} If the silent witness is examined using forensic science, the crime will be revealed, and even the victim who has rotted or been charred and the perpetrator can be identified. Therefore, supporting examinations, especially simple laboratory tests, are very much needed.⁸

The role of forensic science in uncovering crimes

Forensic science has an important role in disclosing a crime that has occurred, especially in cases that are difficult to solve or require special techniques in disclosure.⁴ This is because forensic science was indeed created to facilitate the judicial process, especially in terms of evidence. Forensic science itself consists of various kinds of science, such as pathology and biology, toxicology, criminalistics, forensic medicine, anthropology, jurisprudence, and psychiatry.

In most cases of crimes with physical violence, such as murder, persecution, and rape, it is possible to find blood, semen, saliva, urine, hair, and other body tissue at the crime scene.^{9,10} These materials may come from victims or perpetrators of crimes or both and can be used to help scientifically explain the events of the crime. Materials like these are generally encountered in very small numbers, but the more careful and skilled a forensic expert is, the more that can be uncovered.

Examination of blood spots

If it focuses on evidence regarding body fluids such as blood, seminal fluid, saliva, urine, and sweat, it will focus on forensic serology. Forensic serology is the science used to answer a number of different questions when body fluids are found at a crime scene.¹¹⁻¹³ Examination of blood spots is one of the most frequently performed examinations in the forensic laboratory. Because blood is easily splattered in almost any form of violence, the investigation of these bloodstains is very useful in uncovering a crime. This examination is quite important because blood contains genetic information that is unique to each individual.⁶

Blood tests in forensics actually aim to help identify the owner of the blood. Before a complete blood test is carried out, the examiner must first ascertain whether the red spots are blood. Tests are also done to determine blood type and Rh factor and to find out which antigens and antibodies are present. Therefore it is necessary to carry out an examination to determine; (1) whether the spot is really blood; (2) whether blood comes from humans or animals; and (3)

determining blood type if the blood originates from a human.¹⁰

The most common bloodstains found at crime scenes are on the floor. This is due to the drops of blood that fall to the floor following the direction of the earth's gravitational force. In observing these bloodstains, there are several things that must be considered, one of which is the color of the floor. The color of the floor has an influence on the color of the bloodstains. If the floor is dark, the color of the blood spots will be slightly darker than the original color. The opposite also occurs on floors that have a light color. In addition, the number and volume of blood droplets have an influence on the color of blood spots because the more the number and volume of these droplets on an object, the thicker the surface thickness will make the color of the blood spots more intense than the number and volume of small droplets. Therefore, in describing the color of bloodstains, investigators and forensic experts must consider these circumstances so that the colors of bloodstains found at crime scenes can be properly interpreted.⁵

Until now, there are several methods developed by forensic researchers in the world to assess blood stains. One of them is using tools for electron paramagnetic resonance (EPR), reflectance spectroscopy, and high-performance liquid chromatography (HPLC).^{8,10,14} However, these methods are difficult to apply directly at crime scenes because the process is impractical. The availability of tools and high operational costs makes it difficult not to use these methods. For this reason, the simplest method of assessing bloodstains found at a crime scene is to assess the color of the bloodstains.

Some of the steps taken by the examiner in examining bloodstains at crime scenes are identification of bloodstains, sampling, testing of bloodstain samples, analysis of examination results, and incident reconstruction. In the identification process, the forensic expert will look for traces of bloodstains visible at the crime scene. Bloodstains usually have a brownish-red color and can be found on various objects such as clothing, walls, floors, or other tools used in crimes. Judging the color of the bloodstains can provide clues as to the age of the bloodstains and the time of the crime. Fresh color means that a newly formed bloodstain is usually a

bright red color. This is caused by the presence of oxygen in the blood, which is still quite high. Old color means blood spots that have been forming for a long time will become darker and blackish. This is caused by the oxidation of iron in the blood that occurs when the blood is exposed to air for a long time. The yellowish color means that the blood is coming from a part of the body that contains a lot of fat, such as the mammary glands or liver. A bluish color indicates possible damage to body tissues, such as in the case of stab wounds or gunshot wounds. In comparison, the brown color indicates that the blood is coming from a wound that has healed or blood that is mixed with other substances, such as soil or dust.

After the blood spots are identified, the forensic expert will take samples using sterile equipment. Samples are usually taken using a swab or cloth moistened with a sterile liquid. The sample taken will be examined in a forensic laboratory to find out whose blood type and DNA were left there.^{15,16} The results of blood and DNA analysis will be used as evidence in court. The forensic expert will evaluate the results of the analysis to ensure the accuracy and reliability of the evidence. Then, based on the results of the bloodstain analysis, the forensic expert can plan a reconstruction of the incident and obtain additional evidence that can assist in the investigation.

2. Conclusion

Assessing the color of the bloodstains as a silent witness can provide clues regarding the age of the bloodstains and the time of the crime.

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