



GUNSHOT RESIDUE IN A NON-FIREARM DETAINEE POPULATION

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ABSTRACT

Gunshot Residue (GSR) analysis cannot be overemphasized in firearm shooting investigation, hence gaining popularity in forensic ballistics recently. This article critically reviews the study conducted to ascertain possible presence of GSR on population not directly involved in the discharging of the weapon. The study sampled detainees at Police station whose criminal charge was not connected to firearms. It employed GSR analysis technique to determine presence of particles. From the findings, it was concluded that GSR is unlikely to get transferred to different surfaces. This article therefore scrutinizes the whole study to validate its findings. It discusses the strength that would make finding worth adopted and shortcomings that would not necessitate the adoption [1].

INTRODUCTION

Gunshot residue is the combustion products (burnt and unburnt) of the primer, propellant and in some cases debris from the bullet surfaces. (Martinez, 2019). According to the paper under review, GSR is forensic sub-discipline in Trace Evidence, whose forensic utility is to provide information as to whether there is a primary association of a person or surface with the discharge of a weapon or subsequent handling of a discharged weapon since after the firing GSR sneaks out onto different surfaces [2]. Various techniques are used for determination of its existence for instance, Walker's test, Harrison and Gilroy's test, dermal nitrate test, Scanning Electron Microscopy, Graphite Atomic Absorption Spectroscopy etc.

Basing on its (GSR) significance in linking the shooter to the weapon, the researcher's curiosity was to find out if indeed the deposition of these residues are restricted to the shooter only and not otherwise [3].

The study involved examination of presence of GSR in the hands of non-firearm detainee of Harris County Jail, Pre-trial Services Division who were not charged with any offence relating to discharging of firearm. It used the Scanning Electron Microscope (SEM) to count number of GSR particles. It was concluded from the Study that GSR is not transferred to other surfaces [4].

In the spirit of validating findings of the study for its applicability in the criminal justice system and society as a whole, the review is taking stock of the methodology used and procedures followed. In the course of the review, it will talk about its strong and grey areas, and will put forward suggestions.

EXECUTIVE SUMMARY OF THE RESEARCH PAPER

"Gunshot Residue in Non-Firearm Detainee Population" was a study done to establish the existence of Gunshot Residue on

different surfaces more especially to the people who were not in close to the shooting area [5].

It sampled detainee at the Harris County Jail, Pre-trial Services Division, (they were not charged with any offences related to the discharge of a weapon). The use of these detainees was sanctioned by an institutional review board. The study examined hands of these detainees using Scanning Electron Microscope. Of the 175 samples obtained and tested during the grant period, not one characteristic GSR particle was captured [6].

From the findings, it was concluded that GSR is not likely to be transferred to unintended surfaces.

STRENGTH OF THE STUDY

It is worth mentioning that the study followed scientific research ethics and procedures to the extent that participants did it voluntarily. The strongest point with the study is the use of modern techniques of detecting GSR, for example, to analyze residues in detainees' hands, it used Scanning Electron Microscopy/Energy Dispersive X-ray spectroscopy (SEM/EDX). To date the SEM remains reliable technique in the determination of GSR due to its capacity of scrutinizing materials in simple and interpretable way [7]. As argued by (Zeiss, 2010) SEM has an ability to analyze the elemental composition of even the smallest features on specimens. This makes SEM standing tall amongst other techniques for it becomes possible to make conclusive identifications of the origin of some materials and thus contribute to the chain of evidence. With the use of such an instrument the study was assured to get accurate results. The assertion of SEM being indispensable is echoed by (Nanakoudis A, 2019) who alluded to the fact that it being a versatile tool for material characterization [8]. With usage of such machine, the probability of the results to be rejected/disputed is less. Putting other factors constant the study was likely to bring true findings, basing on the technique used in identifying the GSR on different surfaces.



SHORTFALL OF THE STUDY

Much as the study used the relevant technique, it over generalized its findings to the whole theory of GSR deposition. It cloudily concluded that GSR cannot be transferred from Police officers or their restraining devices in the routine course of business. It did not specify as to which transfer of GSR it refers to, whether primary transfer, which entails the residue fusing straight from the weapon in times of shooting or secondary transfer, that happens in times of handshake with shooter. It could be better if it came clear on this [9].

Whatever the case would be, the study would have considered other confounding factors that could influence the results because in either of the scenarios, transferring of GSR happens. For instance in the secondary scenario where GSR is transferred to a person who was not present during the time of shooting, residue particles do migrate by means of hand shaking etc. Collaborating with this assertion, (French, 2013) argued that secondary transfer of GSR is possible, he said; particles may be transferred to the hands of a second individual via an interpersonal (hand-to-hand) contact and also via a contact with a recently discharged firearm [10].

As for the deposition of GSR on the shooter, in the primary scenario, it is a known fact that remnants of the chemicals in the primer and propellant either burnt or unburnt escape the firearm through any available opening i.e. the muzzle, breech end etc., that means the GSR can be present on any nearby surface including body of the shooter and any material in between the muzzle and target [11].

The same argument was shared by (Heard 2008) who contended that about the mass migration of GSR from the discharged firearm. He cited an example of handgun whose GSR particles exit at a great velocity through the muzzle, while in self-loading pistols the particles fuses from the ejection port. On the other hand, revolvers releases its gases from the gap between the rear of the barrel and the front of the cylinder [12].

The other challenge is that the study was done on one police formation. It is difficult to extrapolate such results to the whole issue of GSR deposition.

With the above arguments it shows that the study could have

done more good in considering other factors before rushing to a conclusion. It is not mentioned in the paper the last time the Police area experienced the shooting, and what was the weather like to wash away the GSR and what happened to these detainees before being tested it may have happened that they did not put on the clothes they wore during the time of GSR transferring.

CONCLUSION AND WAY FORWARD

The review has shown the need to seriously consider all factors that would affect the presence of GSR on unintended surfaces and consider the use of different to complement the findings. Application of relevant methods only on the detection of GSR does not suffice the bold conclusion as in this research.

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