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Original Research Paper

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A CASE OF SUICIDAL POISONING BY INTRAVENOUS ADMINISTRATION OF ANESTHETIC DRUGS

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ABSTRACT An unusual case is reported in which death was caused by self administration of Lidocaine by subcutaneous injection. The Chemical analysis of biological (Viscera, Skin & blood) and non-biological (I.V. Injections & Syringes from crime spot) samples was performed by Thin layer chromatography and confirmed by Gas chromatography-mass spectroscopy (GC-MS). The TLC & GC-MS examination revealed presence of local anesthetic drug Lidocaine in blood and viscera II (which contains pieces of lungs, Liver, Spleen and Kidneys) and local anesthetic drug Lidocaine and Propofol in non-biological exhibit. The Lidocaine concentration detected in blood was 4.05µg/ml and in Viscera content 1.38µg/g. The analytical findings reveals that the cause of death in the case is due to over dose of Lidocaine.

KEYWORDS : Suicide, poisoning, anesthetic drugs, Lidocaine, Propofol, GC-MS.

INTRODUCTION:

Lignocaine [2-(diethylamino)-N-(2,6-dimethylphenyl) acetamide] also known as Lidocaine and xylocaine, It is an amino amide non-irritating local anesthesia. In 1943, Lignocaine was first synthesized by Swedish chemist Nils Lofgren[1].It is widely used as local anesthetic and anti arrhythmic drug. Local anesthetic drug is described as that the absence of sense in part of the body. which on application causes It can be also administrated as a subcutaneous injection, epidural anesthesia, subarachnoid anesthesia and acute myocardial infarction as prophylaxis against ventricular fibrillation [2]. The formulation Lidocaine is parenteral solution and the formulation oral is rare except for gel designed to treat irritated or inflamed mucous membrane of mouth and spray used as local anesthetics in dentistry. In a human clinical setting, a dose of no more than11to15 mg/kg in a single injection would be used for epidural anesthesia [3].

It is used to relieve itching, burning (especially useful on skin damaged by sun exposure) and pain from skin inflammations, it is frequently used in dental clinic to eliminate dental pain and also used in minor surgery[4-5].Lidocaine is administered intravenously or parentally, when given orally its bioavailability is poor because of a very high hepatic extraction ratio [6].

Propofol (2,6 diisopropyl phenol), also known as a sedative-hypnotic agent. It is commonly used intravenous agent for the induction and maintenance of anesthesia and for sedating ventilated patients in intensive care units [7]. Propofol is an extremely rapid-acting intravenous anesthetic. It is used for conscious sedation during endoscopic procedures. Its advantages include less residual postoperative sedation and less psychomotor impairment compared to the barbiturates [8-9].

The objective of the study is extraction of Lidocaine by solvent extraction method and identification by Thin layer chromatography and confirmation done by Gas chromatography-mass spectroscopy. The GC-MS analytical results reveals that the presence of local anesthetic drug such as Lidocaine, which was present in biological and non-biological samples such as blood and viscera II (which contains pieces of lungs, Liver, Spleen and Kidneys).

CASE HISTORY:

A complaint was registered by a 60 years old man to police station that his son who is Doctor by profession and aged about 30 year attempted suicide at home with intravenous injection of an excessive dose of anesthetic drugs Lidocaine and Propofol through saline(Dextrose injection IP D5) as he was suffering from severe stomach pain.

The Neorof propofol injection, Lidocaine injection, Dextrose injection IP D5, empty syringes with needles, packed syringes, plastic lids of injectable, empty Baxter Dextrose injection D5 with tube were seized by police authority from crime scene which were used for suicidal purpose and sent for chemical analysis.

The Viscera I (Stomach with its contents and Pieces of small and large intestine with its contents),

Viscera II (Pieces of Lungs, Liver, Kidney and spleen), Blood, Skin (control and injection site) were sent for chemical analysis after post mortem.

EXPERIMENTAL:

Extraction of Lidocaine from Biological materials:

A portion 100 g of visceral tissue was taken in the 500ml beaker, then10 g of ammonium sulphate and 10 ml of 0.1 m HCL were added and the sample individually minced properly. The PH of minced visceral tissue was adjusted to pH about 9 by adding Ammonia and then each sample was added about 100 ml of Chloroform, Shaken for about half an hour and filtered with Whatman filter paper. Each sample filtrate was then extracted separately with Chloroform. The chloroform extract was transferred into an evaporating dish and again aqueous phase re-extracted with Chloroform. The extracts were combined and the solvent evaporated at room temperature.

Similarly, A portion of 10 g of received injection site skin and control skin were taken in 100 ml beaker, then 2 gram of ammonium sulphate and 2 ml of 0.1 M HCL were added and the sample were cut into small pieces individually in an aqueous solution, PH was adjusted to about 9 by adding Ammonia. Then each sample was

extracted in about 25 ml Chloroform and extract were filtered. The chloroform extract was transferred into an evaporating dish and again aqueous phase re-extracted with Chloroform. The extracts were combined and the solvent evaporated at room temperature.

Again a portion of 15 ml post-mortem blood sample 10 ml of 0.1 m HCL was added to deproteinize the Blood and then PH of blood sample was adjusted to about 9 by adding Ammonia. Then the blood sample was extracted with 25 ml Chloroform in separating funnel, after half an hour extract was transferred to evaporating dish and the solvent evaporated at room temperature.

As per routine forensic toxicological analysis, Biological and non biological samples are generally analyzed by thin-layer chromatography (TLC). The organic extracts of biological and non biological samples were spotted on TLC plates with fine capillary tubes along with its standard. The plates were dried and developed in a presaturated tank containing the solvent system Methanol: Ammonia (100:1.5, by volume). After developing the plates, the extra solvent was evaporated (dried) in fume hood. The plates were then sprayed with various chromogenic sprays to rule out any other poison is present or not. Dragendorff's chromogenic spray reagent which showed characteristics spot of Lidocaine compare with its standard. After detection of Lidocaine in biological and non biological samples received its presence was finally confirmed by GC-MS.

Gas Chromatography Mass Spectrometry method:

GC-MS analysis of extracts from biological and non biological samples was performed on Agilent 7890B GC equipped with Leco Pegasus HT high throughput TOF MS.

Column: RTX-5, Capillary column, Max. Temp. 340°C, 10 m x 180 µm x 0.20 µm.

Column temperature program: Initial temperature 50 °C for 1 min. then increased 10 °C/min to 280 °C, maintained for 5 min.

Run time: 29 min.
Injector Temperature: 260 °C
Transfer line Temperature: 260 °C
Mass Range: 50-450 amu.
Carrier Gas: Helium
Flow Rate: 1.5 ml/min.
Injection mode: Split
Split Ratio: 75

RESULTS AND DISCUSSION:

In this case, biological and non biological samples were analysed by thin layer chromatography.

Dragendorff's spray reagent was showed positive response for Viscera II (Pieces of Lungs, Liver, Kidney and spleen), Blood samples and organic extract of empty syringe which confirmed presence of Lidocaine. Also intravenous kit (dextrose injection D5and) showed presence of Lidocaine & Propofol. While Viscera I, skin and other non-biological sample does not revealed any response of TLC analysis.

For final confirmatory analysis, above Chloroform extract were purified by preparative TLC and extracted solvent was evaporated to dryness and reconstituted with methanol and passed through anhydrous sodium sulphate to remove inorganic phosphate and water content. The methanol extract were filtered with 0.45 micron syringe filter and injected for GC-MS. Viscera II (contains Pieces of Lungs, Liver, Kidney and spleen) (Figure 1 a & b) and Blood showed the presence of Lidocaine[10] (Figure 2 a &b) in GC-MS analysis.

Gas Chromatography mass spectrometry confirms presence of Lidocaine along with Propofol in non-biological exhibits like Intra venous kit (Figure 3a & b) but one empty syringe confirm presence of Lidocaine only (Figure 4a, b & c) ,While Viscera I (Contains Stomach with its contents and Pieces of small and large intestine with its contents), Skin samples do not reveal any peak of Lidocaine and Propofol in GC-MS chromatogram.

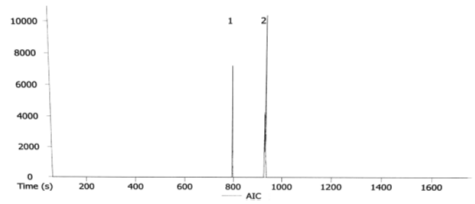

Figure 1 (a): Gas chromatogram of Lidocaine detected in Viscera II

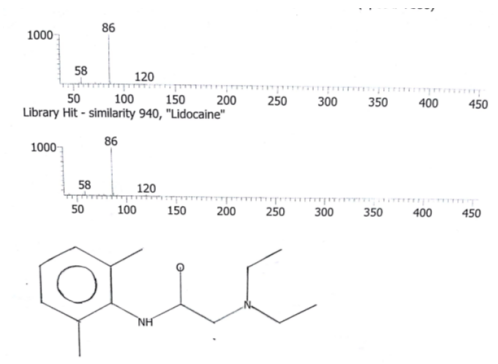

Figure 1 (b): Mass spectrum of Lidocaine detected in Viscera II

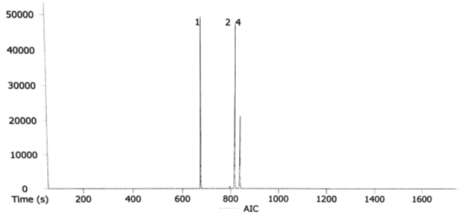

Figure 2 (a): Gas chromatogram of Lidocaine detected in blood

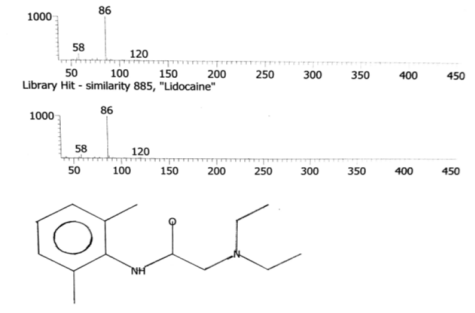

Figure 2 (b): Mass spectrum of Lidocaine detected in Blood

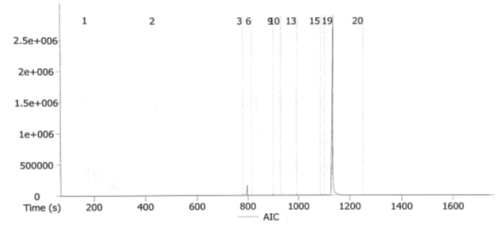

Figure 3 (a): Gas chromatogram of Lidocaine detected in intravenous Kit

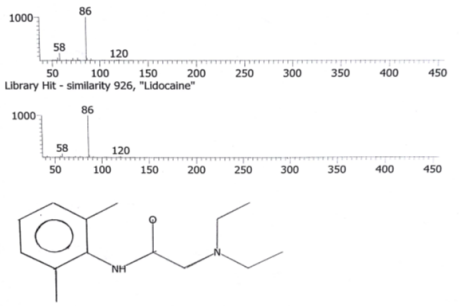

Figure 3 (b): Mass spectrum of Lidocaine detected in intravenous Kit

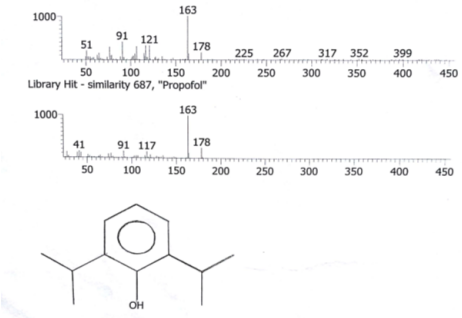

Figure 3 (c): Mass spectrum of Propofol detected in intravenous Kit

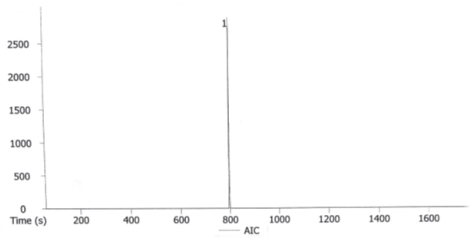

Figure 4 (a): Gas chromatogram of Lidocaine detected in empty Syringe

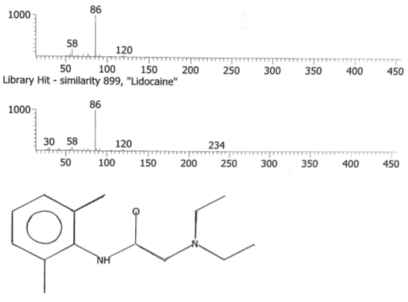

Figure 4 (b): Mass spectrum of Lidocaine detected in empty Syringe

CONCLUSION:

The accurate identification & precise quantification was done by gas chromatography–mass spectrometry (GC–MS) techniques for the individual substances i.e. anesthetic drug Lidocaine and Propofol in the above biological and non biological samples. Hence it was confirmed that in present case, death was due to intravenous drip overdose of Lignocaine Hydrochloride. Thus present study provides useful practical method for detection of anesthetic drugs in both biological and non biological samples received for forensic investigation in near future

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