**Sri Lanka Journal of Medicine** **SLJM**

**Letter to Editors**

Citation: Munasinghe BM[1], Pranavan S[2], Mayorathan U[2], 2023. Pinpointing the additive: A peculiar skin manifestation among intravenous drug injectors. Sri Lanka Journal of Medicine, pp 55-57.
DOI: https://doi.org/10.4038/sljm.v32i1.359

# Pinpointing the additive: A peculiar skin manifestation among intravenous drug injectors

*Munasinghe BM[1], Pranavan S[2], Mayorathan U[2]*

[1]Department of Anaesthesiology and Intensive care, District General Hospital, Mannar, Sri Lanka

[2]The office of the JMO, Teaching Hospital Jaffna, Sri Lanka

**Correspondence:**
Dr. B.M. Munasinghe MBBS, MD (Anaesthesiology)
Consultant Anaesthetist (Acting)
District General Hospital
Mannar.
Email: malakafmp@gmail.com
https://orcid.org/0000-0001-8373-4752

The world has seen a steady rise in people who inject drugs (PWID) during the last 15 years, a significant number represented by the Asian countries. (1) The available Sri Lankan data shows a preference for heroin and cocaine as intravenously injected drugs. (2) Numerous additives are used by the PWID to make these drugs more water-soluble, rapid-acting, and with prolonged euphoric effect. Lime juice is one such additive injected with heroin and less commonly with 'crack' or unpurified cocaine. Initial documented cases of the use of lime juice with intravenous illicit drugs were reported in the late 1980s. (3-4) These early reports were followed by a persistent occurrence of additive (lime juice) associated, localized, and potentially fatal systemic complications including disseminated candidiasis, candida ophthalmitis, endocarditis, and upper limb cellulitis. (3,5-7). Here we report two interesting cases of characteristic skin manifestations in heroin injectors who regularly use lime juice as an additive.

Two suspected intravenous illicit drug injectors were produced by the police for forensic pathology opinion. Both were young males aged 22 and 24 years respectively.

They strongly denied any history or current use of illicit drugs. On examination, distinct 'track marks' were visible on the anterior cubital fossa. These were longitudinal, purplish lines corresponding to the path of the anterior cubital vein (Figure 1a, b). No abscess formation was noted locally and the rest of the vital parameters of the suspects were stable. On further questioning, they admitted using intravenous heroin for the last 3 years. To increase the ease of intravenous administration, they have started adding lime juice prepared by themselves a year back. As the euphoric effect was markedly potentiated by lime juice, it was regularly added to heroin, frequently three to four drops per injection. Following this, they noticed the discoloration of the injecting site which was covered with long sleeves. Up to this medical visit, they have had several episodes of fever within the year which were managed at home. They were referred for further investigations to look for any serious infection which yielded negative results.

The cutaneous manifestations following intravenous illicit use of drugs are multiple.





**Received:2022-05-10** **Accepted revised version: 2023-04-05** **Published: 2023-08-20**

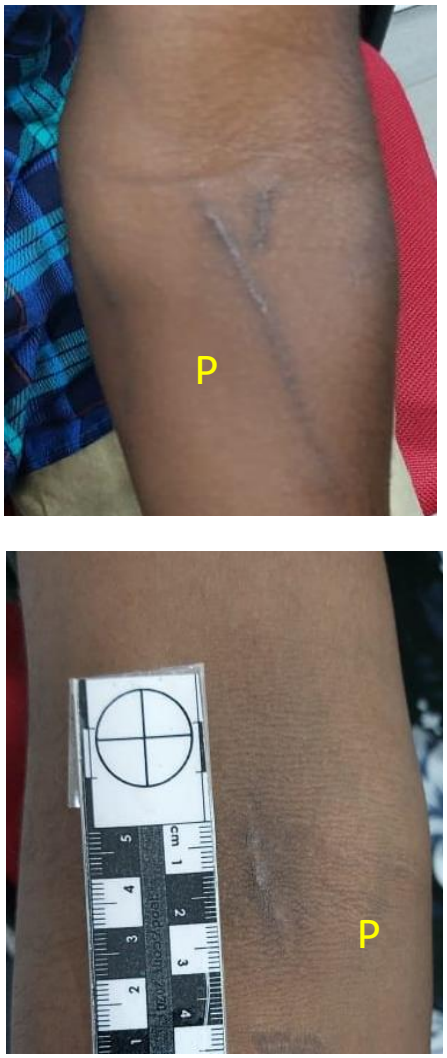


Figure 1 a, b: Purple discoloration of the 'track marks' (P) resulted from lime juice added to heroin over the anterior cubital fossa.

The 'track marks' are produced by repeated intravenous injection and subsequent sclerosis of overlying skin leading to hyperpigmentation. Due to a lack of sclerosing additives, cocaine injections do not lead to track marks in comparison to heroin. The use of lime or lemon juice is believed to exert additional vascular damage resulting in multiple attempts at injection, skin and soft tissue infection, and use of inguinal veins such as the femoral vein with risks of deep vein thrombosis. (8)

To convert to a water-soluble form for intravenous injection, both heroin and 'crack' cocaine need to be mixed with acid. Lemon, lime, and vinegar are the most commonly used, containing citric and acetic acid, respectively. (9) The potentially disruptive nature of highly concentrated lime or lemon juice on injecting vessels and subsequent vein sclerosis was studied by Harris et al. (8) It is thought that contaminated lemon or lime juice is the source of candida growth in the complicated cases. (3) The freely available nature and low cost of these additives pose a greater threat to being used in a non-sterile manner and in high concentrations. Similarly, due to the stigma of using visible veins, modern-day PWID has resorted to anatomical locations such as popliteal veins and femoral veins, which might not reveal the injecting sites and possible local infection related to drug or additive use.

It is essential for the attending physicians to have a thorough understanding of these varied additive uses to suspect and detect resultant local or systemic complications in order to treat them early. Further research and data will invariably be useful on the subject in the local setup where the number of PWID is on the rise.

**Author declaration**

**Acknowledgement:** None

**Author contribution:** BM- Concept, literature review, compilation of the initial version of the manuscript. SP, UM- literature review, acquiring informed consent and photographs, compilation of the initial version of the manuscript. All authors certify the originality of the work described and read and approved the final version of the manuscript.

**Conflict of interest:** None disclosed by the authors.

**Sources of support**: No external funding was received for this study.

**Acknowledgment**: None

**Ethics approval and consent to participate:** Not required as all identifiable data of patients were nullified.

**Consent for publication:** Informed consent was obtained from the patients regarding the inclusion of clinical data and acquiring and publishing photographs.

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