

## Short communication

# Paraquat used as a catalyst to increase the percentage of alcohol distilled in illicit brewing industry of Sri Lanka

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**Illicit brew contaminated with Paraquat, bipyridyl non -selective contact herbicide, resulting in an epidemic of paraquat poisoning was investigated in Sri Lanka. It was found that the brewers use to hang the paraquat bottle with the lid pierced over the distilling cocktail. Brewers believe that condensed particles act as a catalyst, increasing the concentration and quality of the distillate. Clinical data, biochemical and histopathological data were used to confirm the poison. In-depth interviews and group discussions were used to elucidate the mechanism used by the illicit brewers. Due to an accident the paraquat bottle had slipped into the distilling cocktail resulting in this epidemic of paraquat poisoning.**

**Key words:** Paraquat, Illicit, brewers, cocktail.

## INTRODUCTION

Kassippu is an illicit brew in Sri Lanka. Unlike Caju fenny of Goa India, this brew is illegal to be brewed or to be sold. Nevertheless people brew this for domestic consumption and for commercial purposes. Hence a large proportion of population consumes this brew. To evade from law enforcing authorities, Kassippu industry functions secretly within forests and mangrove land. Depending on the availability, brewers use fruits and other substances. It is anecdotally known as the practice of adding ingredients such as barbed wires, mosquito coils, cement and urea to the initial fermentation mixture. It is believed that they act as a catalyst to enhance the strength of the alcohol.

Paraquat is a widely used bipyridyl non -selective contact herbicide (Ja-Liang et al., 1999), which has been used since 1962 (Eddleston et al., 2003). This is a water-soluble quaternary ammonium derivative. The oral route of absorption is very low. This is unbound to plasma proteins (Mare et al., 1998). It is inactivated by absorption of the clay materials in the soil (Seed et al., 2001). Paraquat is a major cause of death in developing countries, such as Pakistan and Sri Lanka (Jones et al., 1999). In the same way, it is a worldwide cause of morbidity and mortality (Jones et al., 1999). Ingestion of Paraquat is a significant method of self-poisoning in parts of Asia, Pacific islands and Caribbean's (Eddleston et al., 2003; 6). An epidemic of poisoning was reported from

a small hamlet in Sri Lanka, Close to the University of Peradeniya. As this poisoning was reported to have been due to consumption of Kassippu, we investigated the epidemic. It found that the people had consumed a contaminated form of Kassippu, at a village funeral. The contaminant, subsequently found to be, Paraquat.

Here we report a novel substances used as a catalysts (Paraquat based herbicides) in this illicit brewery, which is believed to increase the alcohol concentration of the distillate. This instance Paraquat was exposed to elicit brew in higher proportions due to an accident, which caused the epidemic of Paraquat poisoning.

## Objectives

The main objective of the study was to describe the chemical nature of the poison present in Kassippu. Also to elicit the mechanism by which the poison was introduced to the brew and to explore the reasons for the introduction.

## METHOD

Two approaches was used to describe the above objectives. Initially, the clinical information from the Hospital was collated, by a research assistant administered structured data collection

instrument, to get clinical clues and biochemical data from patents, regarding the offending poison. From the autopsies we collected histopathological and biochemical data, to establish the chemical nature of the poison

To elicit the mechanism by which paraquat was introduced to Kassippu and the purpose of the introduction of this lethal chemical, a quantitative approach was used. We used in-depth interviews of the main stakeholder initially. To obtain information regarding the incidence, subsequently we use the focus group discussions with different stakeholders, at the village. Here we test the hypothesis created by our in-depth interviews which is the use of paraquat as a catalyst in the illicit brewing industry.

## RESULTS AND DISCUSSION

Most of the patients consumed Kassippu contaminated with Paraquat at a village funeral, in varying doses, were admitted for observation. Five deaths occurred, two weeks after the consumption of the suspected brew. Post mortem findings were consistent with paraquat poisoning, typical paraquat tongue and with heamoregic changes in the lung (paraquat lung). There was sloughing observed in the gastrointestinal tract specifically the oesophagus. Liver also showed necrosis.

Sodium dithionite test proved the presence of Paraquat both in urine and serum samples. The histopathological findings at the post-mortem were consistent with changes due to paraquat poisoning. Therefore, cause of death was confirmed to be due to paraquat poisoning. Clinical symptoms also indicated that of Paraquat poisoning. Samples of illicit brew confiscated by the police, which were sent to government analyst, confirmed the presence of Paraquat. These evidence direct that paraquat was present in the illicit brew. Then the question to answer was how did paraquat get in to the illicit brew?

### Method of introduction of Paraquat to illicit brew

The focus group, which included son of the brewer, son of the dealer, people who had initially consumed the illicit brew and other villages, revealed information regarding the mechanism by which, Paraquat was introduced to the illicit brew. After piercing the cap of the bottle, the brewer hangs the pesticide bottle over the distilling cocktail. They believe that when the pesticide evaporates due to heat, some particles of the pesticide will condense and act as a catalyst. They know from experience, that this mechanism not only increases the strength but also the quality of the product. We found at the focus group, members of the group who themselves, practice this method for their domestic Kassippu production

During this unfortunate episode, the Paraquat bottle had accidentally slipped into the collection and contaminated the illicit brew. But there had been no changes in the taste or the ordure but only a change in the colour. A dealer who brought this product happened to live next

to a funeral house. As a tradition, people send food and drinks to funeral homes, a practice widely prevalent in Sri Lanka. On this instance, the dealer had offered a part of this consignment of contaminated Kassippu, to the funeral house. The ones who consumed large quantities of alcohol and were anyway alcohol dependent had severe symptoms and died. An observation by a wife of a dealer of Kassippu, at her husband's post-mortem, mentioned that she suspects the blue colour illicit liquor, paved the way to the discovery of this story. All above were detailed results of our focus groups and in-depth interviews carried out at the village temple.

The practice of using paraquat in this manner is widely prevalent in Sri Lanka as subsequently revealed by discussions with brewers. There is no formal chemical study carried out to date, to test the hypothesis that paraquat based chemicals increases the percentage alcohol distilled from the distillation mixture. This should be studied by an interested party, which may have an impact on the distillation industry.

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