

Suicidal Human Poisoning with Fungicide Pencycuron; a Rare Case Report from Rural India with Brief Review of Literature

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ABSTRACT

Background: Pencycuron is frequently used worldwide as fungicide. It is considered to be very effective and safe for humans and its acute toxicity is not yet known.

Case Presentation: Here, we describe a case of severe acute Pencycuron poisoning in a young female with suicidal intent. She was immediately hospitalized in ICU and could be saved with meticulous management.

Conclusion: Such acute and severe poisoning with Pencycuron has not been reported earlier and to the best of our knowledge this is the first case reported so far.

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► *Implication for health policy/practice/research/medical education:*
Human Poisoning with Fungicide Pencycuron

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1. Introduction:

In an agricultural country like India with a predominance of rural population (60-80%), acute agrochemical toxicity is a major health problem as they are freely available and extensively used. This is an important community health hazard throughout the world, particularly in the Asia-pacific region where they are an integral part of agriculture and account for a lot of casualties per year, which are mostly suicidal in nature.

Most of these fatalities are caused by organophosphates (most common in India), organochlorines, and aluminium phosphide compounds, which are an

integral part of agriculture within this region. Due to their intrinsic toxicity, new compounds of low toxicity and high potency are continuously being developed (1).

Pencycuron is such a compound which is widely-used as Foliar Fungicide (2). It claims to exhibit least human toxicity which may present as headache, drowsiness, nausea, vomiting, etc. its acute severe toxicity has not been reported till date (2). In this communication we present a rare incidence of severe acute poisoning due to deliberate self-ingestion of Pencycuron formulation. This case is being

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reported on account of its rarity and significance for community health.

2. Case Presentation:

A young 25 years old housewife, was admitted in casualty at 3.00 PM with an acute episode of headache, vertigo, intractable vomiting, difficulty in breathing, and altered sensorium. She had no previous history of any premorbid illness. According to the history given by the relatives, she was completely alright at 11.00 AM when she had some argument with family members and consumed some chemical (about 70-80 ml) to end her life. Since then she was having recurrent episodes of vomiting along with nausea, headache, dizziness, tinnitus, vertigo and burning sensation and pain in throat and stomach. Later on she became drowsy followed by altered sensorium. She was taken to some local hospital but could not be relieved and referred to RIMS & R, Saifai, a tertiary level hospital in rural region of north India.

At the time of hospitalization, she was restless, confused, dyspneic and delirious. Relatives denied consumption of any drug, poison or medications except for the deliberate ingestion of some liquid (about 70-80 ml), which was later on found to be the Fungicide Pencycuron (22.9 % sc MONOCERN).

Vital signs revealed temp 98.6 F, pulse rate of 72/ minute, blood pressure of 118/68 mmHg, respiratory rate of 22 per minute. Neurological examination revealed GCS of 9/15 (E2V3M4) with reduced movements of all four limbs. Pupils were normal in size and reaction to light. The examination of other systems was normal. Gastric lavage was done followed by symptomatic treatment, but she deteriorated further and became unconscious with temp 99.6 F, pulse rate of 90/ minute and respiratory rate of 32 per minute. She was shifted to ICU at 7.00 PM for close observation and maintenance of vitals. As there is no specific antidote, she was treated symptomatically with IV fluid, Omeprazole, and Antacids along with broad spectrum antibiotics and showed

dramatic response. On the next day he regained consciousness with improved general condition. She was irritable and still having burning sensation in throat and epigastrium. On the third day her psychiatric reference and counseling was done for her irritable behavior and depressive symptoms.

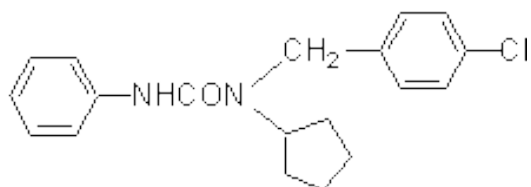
In this case the diagnosis of Pencycuron poisoning was made by reliable information from the victim, her relatives, and used container of the poison brought by them. This was later on confirmed by the lab investigations. After talking to the patient as well as her relatives, this unfortunate incidence was found to be purely suicidal in nature. All the legal protocols were done as per the institutional rules.

3. Discussion:

Different compounds, developed to protect crops are now themselves causing significant health hazards. Acute agrochemical poisoning is a global public health problem and a leading cause of mortality and morbidity in the developing countries of Asia - Pacific region including India. This is mostly due to exposure to organophosphates (most common in India), organochlorines, and aluminium phosphide compounds which are an integral part of agriculture within this region and are readily available at very cheap rate. Due to their intrinsic toxicity, new chemicals of high potency and low toxicity continue to be developed e.g. Imidacloprid, Pendimethalin, and Pencycuron etc, but they are released to the market without appropriate data on direct human toxicity. Instead, human toxicity is often extrapolated from toxicological studies in animals, the relevance of which is poorly defined. They are classified as a "moderate toxic", and generally demonstrate low human lethality but at times they may be hazardous (1).

What is Pencycuron?

Pencycuron (C₁₉H₂₁ClN₂O) is a Synthetic Substance of Phenylurea group; it comes under the Product Category of Foliar



Fungicide (2). Its IUPAC name is 1-(4-chlorobenzyl)-1-cyclopentyl-3-phenylurea

Fig. 1. Structural formula.

and CAS Number is [66063-05-6] (2). It exists in the form of Colorless, odorless crystals. In India it was registered in 2006 and is available as Monceren[®] 125 DS Fungicide (3). Pencycuron is a slightly toxic compound. Its products must bear the Signal Word CAUTION or WARNING. It is also available as Monceren DS, Monceren IM etc. and often supplied as a dry powder for seed treatment (4).

Uses:

Pencycuron exerts its effects by Contact Action. It Inhibits mitosis and cell division (4). It is recommended for different agricultural uses like seed treatment for potatoes [3] and protection of sugar beet, vegetables, Paddy Crops, ornamentals etc. It is also recommended as a preventive application for Sheath Blight control - mostly targeting first round of application. Pencycuron is IPM friendly, reliable and give excellent Results (2).

The Potential Health and Toxicological Effects:

Pencycuron is not acutely toxic via the oral, dermal or inhalation routes; it does not irritate skin or eye, and is not a skin sensitizer (5). It is harmful if inhaled or swallowed (3). It does not inhibit Acetyl cholinesterase, also it is not a Neurotoxicant but it's a Respiratory tract irritant (4). The target organ after repeated exposures (both subchronic and chronic) is the liver. Pencycuron does not show any genotoxic or carcinogenic potential. It is neither a reproductive toxicant nor toxic for the development (5). On Chronic exposure Pencycuron is not mutagenic, and was not carcinogenic or teratogenic and did not induce birth defects in animal studies (3).

It is classified under group IV by US EPA Classification (formulation) and is considered- Not acutely toxic. According to WHO also, it is unlikely to present an acute hazard (4).

Ecological Information:

Pencycuron presents a low hazard to birds, earthworms, bees and mammals. It is toxic to algae and Daphnia (2). But the formulated product is much less toxic to Daphnia. Acute and subchronic toxicities of different agricultural chemicals of common uses have been investigated on Daphnia magna, a useful aquatic organism for testing ecological toxicities. In this study, pencycuron was suggested to have slow-acting toxicity (6).

The scenario of poisoning in India:

The exact incidence of poisoning is not known in India due to lack of central registry but approximately it accounts for 10% of admissions in medical emergency. Poisoning is typically suicidal in nature which is ranked as third leading cause of death in age group 15-44 years. It was responsible for around 600,000 deaths in 1990s (7). In the past 50 years suicide rates have increased by 60% (8).

After accidents and maternal mortality; suicide is the leading cause of death among the young in India, with a high prevalence in rural areas. Suicide is second leading cause of death among young people and with the decline in maternal death rates; it could soon become the leading cause of death among young women in India. Ingestion of agrochemical compounds is the principle mode for suicide. Of the 1.87000 people who committed suicide in India in 2010, around half (49% men and 44% women) consumed poison, mainly pesticides (9).

Most of these toxicities occur due to exposure to (OP), organochlorines and aluminium phosphide. Among them, organophosphates OP poisoning is most common in India and chiefly presents as deliberate self-ingestion in young population (20-30 years) for suicidal purpose and quite uncommon in aged people more than 50 years. A case of a 55

years old farmer has also been reported, who developed significant toxicity by accidental inhalational exposure during handling of multiple OP pesticides (10).

Acute poisoning is a medical emergency, which poses a major threat to life. Its type, associated morbidity and mortality varies from place to place and changes over a period of time. The incidence of poisoning is rising in India. More than 50,000 people die of poisoning every year (11). In India, OP compounds are the commonest class of pesticides which have been implicated in cases of poisoning, as ours is an agriculture based society and pesticides are readily available at a cheap rate. The OP toxicity chiefly presents as suicidal attempt by oral ingestion. Other routes of administration and modes of Poisoning are very uncommon.

There is dearth of literature on Pencycuron toxicity; it is a urea derivative fungicide of very low toxicity. However co-ingestions with other similar chemicals may be hazardous. In case of Systemic poisoning the treatment is principally symptomatic as there is no specific antidote (3).

Emergence of such entirely new poisoning by the so called non-toxic compounds is a big challenge to community health especially in rural population. There clinical outcomes rely on early recognition, prompt referral and aggressive treatment in collaboration with different specialties. Awareness programs about such new toxicities should be implemented at different levels. This article illustrates that ingestion of these so called non-toxic and safe compounds may also lead to significant toxicity which has not been reported earlier. The treating physicians should have a close watch and pay more attention to these patients (1).

Such incidences are alarming as the clinical consequences of poisoning with such relatively newer and nontoxic compounds are not very well described, therefore such information/case reports are valuable for clinicians and concerned authorities and may help to save a number of precious lives (1).

4. Conclusion:

Substitution of existing highly toxic agrochemical compounds by the newer less toxic compounds in areas where the incidence of their poisoning is high may help to save a number of precious lives. But such occurrence by these so called nontoxic compounds is a big challenge to community health. Their clinical consequences are not very well described and outcomes rely on early recognition, prompt referral and aggressive treatment in collaboration with different specialties. Therefore such information/case reports may help to improve clinical management and inform pesticide regulators of their relative toxicity. Awareness programs about such new toxicities are also highly valuable.

Though the appropriate and timely management has vital role, the importance of preventive measures and public awareness cannot be ignored in saving precious lives and should be implemented at different levels.

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References

1. Kumar A, Verma A, Jaiswal K, Kumar S, Prasad R. Emergence of entirely new poisoning in rural India; an upcoming health hazard to the community health. *Ind. J. of Community Health*, 2012;24(3):248-251.
2. Bayer - <http://www.bayergroupindia.com/pencycuron.html>
3. Monceren® 125 DS Fungicide; MATERIAL SAFETY DATA SHEET Monocern.pdf Date of Issue: October 8th, 2008. <http://www.bayercropscience.com.au/resources/uploads/msds/file7231.pdf>

4. Article available on <http://sitem.herts.ac.uk/aeru/iupac/510.htm>
5. European Food Safety Authority; Conclusion on the peer review of the pesticide risk assessment of the active substance pencycuron. EFSA Journal 2010;8(10):1828.
6. Matsumoto K, Hosokawa M, Kuroda K, Endo G; Toxicity of agricultural chemicals in *Daphnia magna*. Osaka City Med J. 2009; 55(2):89-97.
7. Eddleston M. Patterns and problems of deliberate self poisoning in the developing world QJM. 2000;93:715-31.
8. Krishnaswamy Sampathkumar, Sooraj Yesudas. Hair dye poisoning and the developing world. J Emerg Trauma Shock. 2009;2(2):129-131.
9. 40% of India's suicides in four southern states; an article in The Times of India, 23 June, 2012.
10. Kumar A, Pathak A, Verma A, Kumar S. Accidental Inhalational Poisoning by Multiple Pesticides of Organophosphorus Group in an Aged Person; an Uncommon Occurrence. J. of Forensic Medicine & Toxicology. 2012;29(2):78-83.
11. Aggarwal P, Handa R, Walia JP. Common poisoning in India. JFMT. 1998;15(1):73.