

Review Paper

Drug of Abuse: Precursor Chemicals

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Abstract

These days precursor chemicals are one of the most common cause of drug abuse problems worldwide. Most of the cases are reported in past few years in forensic labs in which ephedrine, pseudoephedrine and phenylpropanolamine were detected. Since reports predict about new harmful substances which are being emerging with unfailing regularities of drug scene, it is now challenged to speed and creativity in the analysis of these new psychotropic substances. This is an alarming drug problem arising in inflating rate. But, these drugs are sold via the internet and show more deleterious effects than other traditional medicines. The limitless scope to change the composition of chemical structure of new psychotropic substances and formulations shows outpacing exploration into international control. In this paper an determined attempt has been inculcated to show the factors and causes responsible for inflating abuse of these precursor chemicals.

Keywords: Precursors, ephedrine, pseudoephedrine, phenylpropanolamine.

Introduction

A precursor is a compound which involves themselves in a chemical reaction to produce another compound having narcotic properties^{1,2}. Precursors have both licit and illicit uses. Licit uses include to concoct the production of pharmaceutical products, cosmetics items, oils, fertilizers etc. whereas illicit uses include fabrication of medicinal substances such as cocaine, ecstasy, heroin, Amphetamine. Due to wide legitimate uses of these precursors, trade cannot be prohibited. As per UNO, on drug and crime report, the number of NPS has been increased from 166 at the end of 2009 to 251 by mid of 2012¹¹ leading to an increase of more than 50%. In the present article, effort has been made to look for various causes responsible for

these drug abuse and precaution required to overcome such intimidation.

Chemistry of Precursors

Ephedrine has optical isomerism shows two chirality at two centers which leads to four stereo isomers³. On the basis of convention, pair which is an enantiomer showing (1R, 2R, 1S, 1R) stereochemistry is ephedrine while (1R, 2R and 1S, 2S) is called as pseudoephedrine⁴. The presence of a hydroxyl group states the difference of ephedrine and its structural analogue of methamphetamine. Ephedrine's diastereomer is pseudoephedrine which is reduced to methamphetamine and is oxidized to methacathinone⁵.

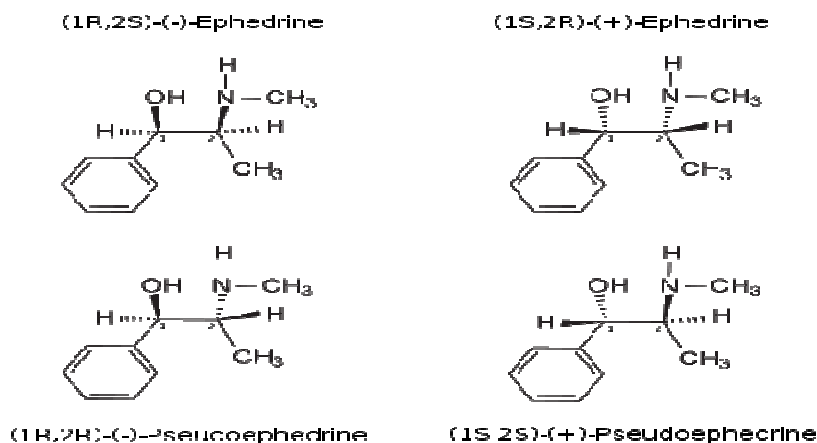


Figure-1
Structure of ephedrine and pseudoephedrine

Phenylpropanolamine has four optical isomers like dextro- and a levo- norephedrine, norpseudoephedrine. Dextro-norpseudoephedrine is a naturally occurring product called cathine⁶. While phenylpropanolamine comes in phenethylamine family composed of cyclic benzene and phenyl group with having moiety with carbon and ethyl group, it also contains terminal nitrogen⁷.

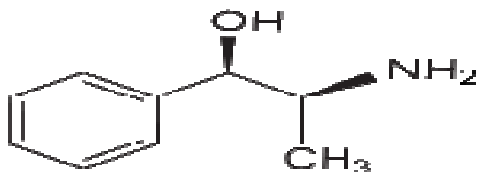


Figure-2
Structure of phenylpropanolamine

Mechanism of Action of Precursor Chemicals

Since pseudoephedrine shows properties of sympathomimetic amine group. Action depends on adrenergic receptors, its action puts on its viability on beta-2 and alpha adrenergic receptors present on the lining of muscles and walls of blood vessels and thus leads to relaxation and vasoconstriction of bronchial smooth muscles⁸. The action is stimulated by activation of these receptors, as soon the contraction of muscles takes place, the blood vessels which are constricted allows minimal fluid to vacate in order to pass through nose, sinus and also throat as a result it leads to dwindling production of mucus⁹. While impelling of beta-2 adrenergic receptor leads to dilation of bronchi which in turns leads to lessen the congestion¹⁰.

PPA mechanism of action is based on alpha and beta adrenergic receptors which are present in the mucosal lining of respiratory tract. Stimulation power of alpha adrenergic receptors shows vasoconstriction which leads to reduction of edema, hyperemia and nasal congestions thus, leads to inflate potency of nasal airways. While indirect action stimulates beta receptors to produce positive inotropic effect and tachycardia.

The genesis of this review is based on the cases reported in Forensic science laboratory, government of national capital territory, in New Delhi for past three years.

Table-1

Cases reported for precursor chemicals in Forensic science laboratory

| S.No. | Precursor | Cases reported |
|-------|-----------------|----------------|
| 1 | Ephedrine | 2 |
| 2 | pseudoephedrine | 3 |

Factors responsible for abuse of precursor chemicals: Ephedrine has licit uses which include manufacturing of pharmaceuticals products, perfumes, cosmetics, fertilizers, oils, etc; whereas illicit uses include manufacture of banned drugs

such as amphetamine, etc and due to this wide legitimate uses of these precursors trade cannot be prohibited. Due to their easy availability in the market, ephedrine is widely abused. Due to its low cost and high potential, ephedrine and other precursors is most excessively used as over the counter stimulant use or dependence and hence misused. Exploitation of new compounds in the pharmacy as widespread use as prescription drugs. Supplements of diet containing alkaloids of ephedrine are widely used to increase energy and to loose weight, the excessive use of such supplements leads to addiction.

Precautions to be taken to avoid precursor abuse: Use of these drugs as prescription drugs should be banned. Precursors should be enlisted in the list of psychotropic substances as precursor chemicals in the NDPS act. The use of these drugs should be regulated and checked thoroughly. Awakening people for such abuses. To avoid medicate yourself as it leads to addiction and later result to abuse.

Conclusion

Since the precursor chemicals are known for their allowable uses and non allowable uses, their impact on human effects severely by repeated uses which lead to addiction. Since addiction leads to abuse, their effects on society are detrimental. In this above paper, various precautions has been discussed which may aware the society about the addiction and abuse and leading to freedom from such dependence and habituations.

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