L-Università ta' Malta
Faculty of Medicine & Surgery
Department of Pharmacy

Synthetic Drugs of Abuse Exhibiting Kinetic and Non-Kinetic Toxicology

Sarah Xuereb, Janis Vella Szijj, Lilian M. Azzopardi

Department of Pharmacy, Faculty of Medicine and Surgery, University of Malta, Msida, Malta

email: sarah-xuereb@hotmail.com

INTRODUCTION

Toxicological effects can be categorised into kinetic and non-kinetic. Kinetic toxicology, involves toxicant effects exerted when a drug is absorbed, distributed, metabolised and eliminated by the body whilst non-kinetic toxicology involves the negative outcomes which occur at the exposure site of the drug.

AIMS

The aims of the study were:

- To analyse and compare the kinetic and non-kinetic toxicological effects following the use of cocaine, 3,4-Methylenedioxymethamphetamine (MDMA) and synthetic cannabinoids
- To relate kinetic and non-kinetic effects to clinical scenarios

METHOD

Literature review was carried out about the kinetic, non-kinetic toxicological effects and clinical cases involving the use of cocaine, 3,4-Methylenedioxymethamphetamine (MDMA) and the synthetic cannabinoid JWH-018 between January 1998 and December 2018. Search engines used to obtain literature related to kinetic toxicological effects, non-kinetic toxicological effects and clinical effects were HyDi and PubMed.

Keywords such as ‘cocaine oral mucosa’, ‘cocaine pharmacokinetics’, ‘cocaine insufflation’, ‘cocaine clinical cases’, ‘MDMA metabolism’, ‘MDMA pharmacokinetics’, ‘MDMA oral mucosa’, ‘MDMA case reports’, ‘JWH-018 excretion’, ‘JWH-018 pharmacokinetics’ and ‘synthetic cannabinoids case reports’ were used.

RESULTS

Non-kinetic effects were identified less in literature than kinetic effects and this could be due to the fact that non-kinetic effects occur following prolonged exposure to the drug and are observed less commonly. In cases related to cocaine use, non-kinetic toxicological effects such as nasal obstruction can occur after years of exposure to cocaine unlike certain kinetic effects such as nausea which has been reported after a single use of the drug. Table 1 and 2 show results attained from the literature search.

Table 1: Most Common Kinetic Toxicological Effects

Cocaine (n=101)	MDMA (n=64)	Synthetic Cannabinoids (n=229)
Chest pain (n=19)	Seizures (n=13)	Emesis (n=108)
Hyperthermia (n=13)	Agitation (n=10)	Nausea (n=106)
Nausea (n=9)	Emesis (n=9)	Tachycardia (n=86)

Table 2: Most Common Non-Kinetic Toxicological effects

Cocaine (n=28)	MDMA (n=4)	Synthetic Cannabinoids
Nasal Septum Destruction (n=8)	Pneumomediastinum (n=2)	N/A
Necrosis (n=4)	Necrosis (n=2)	N/a

CONCLUSION

Knowledge of kinetic and non-kinetic toxicology of drugs of abuse can help create awareness about the ill effects that these drugs may cause and provide the clinician with more information about treatment and prevention and associated complications. Further studies related to other drugs can help enhance the awareness necessary related to the ill effects which may be caused by the administration of drugs of abuse.