Health and Psychological Consequences of Amphetamine Type Stimulants (ATS) Abuse

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Amphetamine Type Stimulants (ATS)

- First synthesized in 1887
- Methylphenidate, dextro-Amphetamines, Methamphetamine(Meth), Methyleneoxyamphetamine(MDMA)(Ecstasy)
- Medicinal Use
  - Nasal decongestants
  - To treat narcolepsy
  - To treat Attention Deficit Disorder
  - To treat obesity
  - To treat chronic resistant depression
- Have been replaced by methyl phenidate, pemoline or other safer stimulants
What are Amphetamines?

- MDMA (Ecstasy, Adam, Bean, E, M, Roll, XTC)
- The unusual properties: the R(-) isomers produce LSD-like effects and the amphetamine-like properties are linked to S(+) isomers.
What are Amphetamines?

- Methamphetamine known as "speed," "meth" and "chalk." In its smoked form, it is often referred to as "ice," "crystal," "crank" and "glass."
What are Amphetamines?

- Methamphetamine comes as a white, odorless, bitter-tasting crystalline powder that easily dissolves in water or alcohol.
Epidemiology

- Most Amphetamines is used in S.E.Asia and Americas
- Annual Prevalence of Amphetamine abuse among 15-64 yrs in 2003-05 in S.E.Asia was around 0.5% (Global 0.6%)
- Annual Prevalence of Ecstasy abuse among 15-64 yrs in 2003-05 in S.E.Asia was around 0.1% (Global 0.2%)
- As yet, very little abuse of ATS has been reported in SA

Epidemiology-ATS Use in India

- Ever use - 3.3% in RSA (Mittal & Chien, 1998)
- Ever use- NHS (National Survey) 0.03% (Ray et al, 2004)
- Current use-DAMS (National Survey) 0.2% (Siddiqui et al, 2002)
- Current use-RAS (National Survey) - Nil (Kumar et al, 2002)
- Current use-Border study (National Survey)- Some users detected (Sharma & Kala, 2003)
Epidemiology

Who are more prone?

- Children with ADHD
- Those suffering from PTSD
- Those suffering from mood disorders (self-medication hypothesis)
- Those adolescent and adults already using inhalants, cigarettes, cannabis, alcohol (gateway hypothesis)
- Men for sexual pleasure, indiscriminate sexual behaviour
Epidemiology

Who are more prone?

- Those with social phobia
- Those with conduct disorder or antisocial personality disorder
- Those impulsive and high risk taking behaviour
- With personality traits of physical fearlessness and reward sensitivity
- Adolescent females with abnormal weight control behaviour
Neuropharmacology

- Amphetamines are sympathomimetic central stimulants-CNS stimulation
- Its pharmacological action is exerted indirectly by sustaining high levels of catecholamines in the synaptic cleft and directly by binding to the postsynaptic adrenergic receptors
- Indirect catecholamine agonist
- Also releases serotonin
- Blocks reuptake of dopamine.
Amphetamine undergoes extensive renal excretion and significant amounts are present in urine as the unchanged parent drug. The concentration of amphetamine in urine was about 200 times greater than the concentration in blood.

Other factors could impact on the urine-blood amphetamine relationship, such as urinary pH, creatinine, route of administration, pattern of voiding and time elapsed after use of the drug.
Acute Effects

- Immediately after smoking the drug or injecting it- extremely pleasurable ‘rush’ or ‘flash’.
- Enhanced mood and body movement
- Euphoria
- Increased respiration
- Insomnia
- Increased heart rate
- Increased blood pressure
- Reduced appetite
- Dilated pupils
- Perceptual abnormalities- visual and tactile hallucinations or illusions
Withdrawal State

- Irritability
- Anxiety
- Paranoia
- Aggressiveness
- Fatigue and long periods of sleep
- Dysphoria, Drug hunger, Urges, Craving
- Anhedonia

- Lasts few days usually
- Early → Intermediate → Late withdrawal
Health Hazards - Physical

- Oral
  - Xerostomia and dental caries-related to decreased salivation
  - Chronic bruxism
- Hyperthermia
- Muscle and renal damage
- Acute transient urinary retention
Health Hazards—Physical...

Peripheral and Central Neuronal Damage

- Motor in-coordination—proneness to accidents
- Impaired decision making in chronic users—due to frontal lobe dysfunction
- Cognitive impairments even with single dose and persist in chronic abusers in spite of abstinence
- Hearing loss—can be reversible
- Tremor, dyskinesia, dystonia
- Parkinsonism
- Convulsion
- Coma

(Moszczynska et al., 2004)
Complications related to injectable drug use

Cerebrovascular catastrophes

Cardiovascular complications
  - Acute coronary spasms- presenting to emergencies as chest pain
  - Hypertension
  - Infective endocarditis
  - Myocardial infarction and congestive heart failure
  - Myocardial hypertrophy
ATS use can be associated with increased sexual activity, often accompanied by poor judgment, and are at increased risk for STIs, including infection with HIV.

ATS not only increases risk of HIV transmission, but also impairs adherence to it treatment and following safe practices.
Use during pregnancy and perinatal period

- Related with more pregnancy complications
- Anaesthesia related complications
- Small for gestational age children
- Infants are also psychosocially disadvantaged and are at greater risk for abuse and neglect

*(Smith et al 2003; Thaithumyanon et al, 2005)*
Death among ATS abusers

- most common complication – Hyperthermia, Rhabdomyolysis with acute renal failure
- Overdose, toxicity
- Could be accidental, homicidal, or suicidal
- Among all deaths due to drug abuse - In 17% of cases ecstasy was the sole drug implicated in death and in rest poly-drug abuse found

*(Shaw, 1999 & Schifano, 2003)*
**Paranoid psychosis (following long-term abuse)**

- Resembles schizophrenia
- Persecutory delusion followed by auditory hallucinations, strange or unusual beliefs, and thought reading.
- Vivid visual or tactile hallucinations
- Atypical paranoid psychosis – single dose exposure
- In vulnerable individuals, dose-independent ecstasy abuse can lead to unpredictable and potentially dangerous neuropsychiatric squeal

*(Vecillio, 2003)*
Psychosis remits within a week, rarely lasts months

Hyperstartle reaction

Stereotyped behaviour

First use of amphetamines or cocaine before the age of 16 years increased risk of psychosis

Family loading of psychiatric disorders present

(Farrell et al, 2002)
Hazards - Psychological...

- **Depression** - as part of withdrawal can occur
- **Mixed affective state** is more common in bipolar patients, poor outcome of episode
- **Social withdrawal** - in intoxicated state or due to psychosis
- **Abnormal motor activity** - stereotyped behaviour such as repeatedly assembling and disassembling electronic equipment may occur in intoxicated or withdrawal state, in delirium or in actively hallucinationating persons
- Aggression
Management

- **Supportive therapy**
- Brief interventions
- Motivational interviewing
- Most effective is cognitive behavioural interventions
  - to help modify the patient's thinking, expectancies and behaviours and
  - to increase skills in coping with various life stressors.
- Use of recovery support groups
- abstinence-based incentive procedure (giving prizes for producing drug free urine samples during treatment) efficacious in improving retention and associated abstinence outcomes

*(Petry, 2006)*
Management...

Specific treatment
- Not met with much success since no single agent has proven efficacious in controlled clinical studies
  - Antidepressant medications-in recent abstinent patients
  - Bromocriptine
  - Amantadine
  - Methylphenidate
  - Topiramate
  - Naltrexone
Most are case reports & claimed favourable outcome
Conclusions

- ATS abuse adversely impacts physical functioning, brain functioning and cognition, social support and social networks, and behavioural functioning.
- Existing data indicate moderate levels of ATS use and relatively low levels of mortality and acute morbidity.
- However, there are several areas of concern including possible mental health effects and high levels of suspected adulteration of MDMA.
- Data point to a relationship between ATS use and risky behaviours including unprotected sex.
Future Efforts

- Educating youth on ATS - best approach
- General practitioners –
  - Observe for use in young people
  - Play a wider role in identifying drug related problems, providing interventions, referrals, and coordinating care.
- A public health approach is recommended, including prevention campaigns, harm-reduction outreach and treatment approaches, and pharmacological and abstinence-based drug treatment approaches.
Future Direction...

- In India
  - 1982 Asiad games brought in the epidemic of heroin use
  - will 2010 Commonwealth games bring stimulant epidemic (cocaine and amphetamine)???