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Performance and Image Enhancing Substance (PIES) Addiction: A case report.

Dr. Apoorva Selvaraj[1], Dr. Farhana M[2], Dr. Lakshmi Prabha[3], Dr. Rajkumar[4]
[1]Post-graduate, [2]Senior Resident, [3]Associate Professor, [4]Professor and Head
Department of Psychiatry, Sree Balaji Medical College and Hospital, Chennai, Tamil Nadu, India.

Abstract: *A desire for a fit body has recently gained popularity, striving for which has involved an increasing use of performance and image-enhancing substances (PIES), the abuse of which represents an increasing health problem. There is data that shows that the use of such doping agents results in considerable physical and psychological consequences, which are affecting most users in varying severity. This is a case report of Mr. X, a young male non-athlete, using PIES (fitness doping) in a dependence pattern, presenting with drug-induced liver injury and mood-related behaviour changes.*

Keywords: *Case report, performance and image enhancing substances, PIES, Anabolic-androgenic steroids, steroid dependence, psychological effects.*

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I. Introduction

A focus on health and a healthy body is a significant feature of today's society. The attempt to achieve an aesthetically fit body, especially after the influence of social media, has involved an increasing use of performance and image-enhancing substances (PIES). The abuse of PIES represents an increasing health problem, that almost one in five young exercisers has the experience of using these substances. The illicit use of doping agents by athletes and non-athletes may be 1–5% in the general population and greater than 50% in some groups.[1]

There is also evidence that the use of doping agents such as anabolic-androgenic steroids, growth hormone, etc. results in considerable health risks like cardiovascular disease, hepatic and renal impairment, diabetes, cancer, mental health issues, musculoskeletal disorders, virilisation in females and the suppression of naturally produced androgens in males, which are affecting most users in varying severity.[2]

This is the case report of Mr. X, a young male non-athlete, using PIES (fitness doping) in a dependence pattern, presenting with drug-induced liver injury and mood-related behaviour changes. This case is presented to shed light on an emerging addiction area, fitness doping (PIES) and its related physical and psychological effects and the challenges in their management of behavioural changes so that effective interventions can be formulated.

II. Case Profile

A 25-year old single male, Mr. X, was admitted to the intensive care unit of our tertiary care hospital with suspected drug-induced liver injury. He was a well-educated graduate, living in an urban area in India. The patient's family reported a history of irritability, anger outbursts, aggressive, assaultive and destructive behaviour on and off for the last six months. He had also not been consistent in his job and frequently missed work. On eliciting the history further, it was known that he had regular use of anabolic androgenic steroids like Methandienone, Nandrolone Decanoate, Testosterone Cypionate as well as growth hormone, insulin-like growth factor and other performance-enhancing drugs since six months, with the last use being a few days prior to admission. There was no history of previous psychiatric illness or any relevant family history.

Mental status examination showed that the patient was slightly uncooperative, had normal psychomotor activity and spoke minimally but relevantly. He had a dull but slightly irritable affect when probed about his PIES use with a restricted range. He had a craving for PIES and expressed that despite the physiological consequences caused by their use which he believes can be managed, he intended to continue using them for aesthetic purposes. On enquiring about delusions and hallucinations, he denied them.

Primary mental functions were intact, but he had a lack of insight (grade 1) into his substance use disorder.

On physical examination, his vitals were stable. Icterus and bilateral fine tremors were present. Further blood and radiological investigations were done and the significant findings were as follows:

- Total Bilirubin-16 mg/dl
- Liver enzymes: AST- 147, ALT- 309, GGT- 564.
- Abdominal ultrasound revealed increased echotexture of the liver, suggesting parenchymal liver disease and splenomegaly.

He was treated with oral Olanzapine 5mg and Lorazepam 2mg, with parenteral Haloperidol 2.5mg and Promethazine 25mg SOS for agitation. Subsequently, his irritability started reducing with improvement in his sleep quality and he was eventually discharged after physical stabilisation. He continued to maintain abstinence from PIES with a reduction in behavioural symptoms, which was assessed during his follow-up two weeks later. However, liver injury with resultant jaundice continued to persist.

III. Discussion

Usage of AAS /PIES reportedly have significant adverse effects on multiple organ systems and psychological manifestations as well. To worsen it, there is a widespread misperception that PIES use is safe or that adverse effects are manageable.[2] This case is being highlighted to emphasise the important health consequences (both physical and psychological) of PIES.

Studies have suggested that some AAS users exhibit hypomanic or manic symptoms during AAS exposure (characterized by irritability, aggressiveness, exaggerated self-confidence, hyperactivity, reckless behaviour and occasional psychotic symptoms) and depressive symptoms during AAS withdrawal (characterized by depressed mood, loss of interest in usual activities, hypersomnia, anorexia, loss of libido, and occasional suicidality).[3] Some studies have found uncharacteristically aggressive or violent behaviour in some AAS users who had no history of such behaviours.[4]

In addition to AASs, nonathlete weightlifters and athletes also use human growth hormone (hGH) and insulin-like growth factor (IGF-1), human chorionic gonadotropin (hCG), somatotropin, because they are known to enhance the effects of AASs or reduce their adverse effects, and have recently become available on the black market at a reduced cost.[5-7]

Steroids have been shown to have dramatic impacts on aggression, as well as its signalling molecules and receptors, in both human and animal research, showing that large dosages of AASs can generate aggressive behaviour.[8-12] In mice, a variety of signalling pathways are implicated in mediating the effects of AASs on aggressive behaviour. Neural circuits that utilise signalling via excitatory amino acid systems and monoaminergic and peptidergic neurotransmitters are linked with aggression. The anterior hypothalamus, periaqueductal grey, and amygdaloid nuclei (particularly the central and medial amygdala) are major brain areas implicated in aggressive behaviour. Depending on the type of AAS used, some or all of these brain regions are chronically activated with supraphysiological doses of AAS.[13]

AASs cause acute and chronic alteration in the γ-aminobutyric acid (GABA) neurotransmission, which has a role in aggression.[14] Additionally, it has effects on the glutamate and dopaminergic system, also known to be involved in aggressive behaviour.[12,15] The serotonergic system also may have an important function in the control of the aggressive dominance induced by AAS.[16] The serotonergic 5-hydroxytryptamine $(5HT)_{1B}$ or $5HT_2$ receptors may play a role in the mediation of emotional states and behavioural changes that we see among human AAS users.[17] Our patient also exhibited symptoms of irritability, aggressiveness, and reckless behaviour during the usage period which was in line with reported studies, which continued during the withdrawal phase also.[18]

Reports about AAS/PIES having significant adverse effects on cardiovascular and hematologic systems, psychiatric and neuropsychologic effects and hormonal and metabolic effects, have also begun to emerge. PIES have been found to cause hepatotoxicity, with adverse consequences including peliosis hepatis (an accumulation of blood-filled cysts in the liver) and various types of hepatic tumours.[19] In our case, it has caused significant liver parenchymal disease and persistent jaundice, even after 3 weeks of abstinence.

IV. Conclusion

Performance and Image Enhancing Drug use appears to be far more prevalent than is generally believed and is widespread among non-athlete weightlifters but is missed due to its inconspicuous use. Its use is associated with serious health consequences including psychiatric manifestations and hepatic adverse effects which need to be looked out for.

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