

A Review of the Neurobiological and Socio-Economic Impacts of Substance Use Among Young Adults in Punjab

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Abstract:

The use of substance among youth in Punjab has reached alarming levels contributing to deep neurobiological and socio-economic consequences. The purpose of this review is to synthesize current research on how substance abuse impacts neurotransmitter systems with a focus on dopamine, serotonin, GABA and glutamate and examines the resultant socio-economic impacts like unemployment, poverty and social stigma as well. The article also evaluates present intervention strategies and policy measures while highlighting gaps in the literature and proposing future research directions. This review paper also aims to provide a holistic understanding of the neuropsychological and socio-economic ramifications of substance use among Punjabi youth.

Keywords: Neurobiological and Socio-Economic Impacts, Youth, Substance, Punjab

Introduction

Punjab has been facing a severe crisis of substance abuse, especially among young adults aged 18 to 35. The youth in both urban and rural regions are highly vulnerable due to easy access to drugs like opioids, heroin, narcotics and alcohol. The paper explores dual impacts of substance use: its impacts on neurotransmitter systems which contribute to addiction and mental health disorders and its socio-economic implications like declining productivity, family breakdown and public health burdens.

Neurobiological Effects of Substance Use

Dopaminergic System: The substances such as opioids, alcohol and the stimulants act directly on the mesolimbic dopamine system the reward circuit of the brain and the chronic use leads to downregulation of dopamine receptors which cause anhedonia and reinforcing dependency (Volkow & Morales, 2015).

Serotonergic System: The drugs like MDMA & LSD alter serotonin levels that are crucial for mood regulation. Their chronic use leads to serotonergic neurotoxicity, contributing to depression and anxiety disorders (Liechti, 2017).

GABA and Glutamate Systems: The alcohol & benzodiazepines enhance GABAergic activity which leadsto sedative effects while withdrawal results in hyperexcitability because of altered glutamatergic signaling. The long-term disruptions can impair cognitive functions (Koob & Volkow, 2016).

Socio-Economic Impact in Punjab

The unemployment and productivity Loss: The dependence on drugs reduces work efficiency, increases absenteeism and leads to job loss. The young adults who use substance use disorders are often unemployable, exacerbating poverty in affected households (Singh & Singh, 2021).

The Social Instability & Crime: The increased involvement in petty crimes, theft & violence is commonly reported among drug users which contribute to regional instability and burdening the criminal justice system (Sharma & Kaur, 2020).

The Mental Health & Family disintegration: The use of substance abuse strains family relationships leading to domestic violence, marital breakdowns and neglect of children. These results perpetuate cycles of poverty and mental health issues (Gill & Mahajan, 2019).

Current Interventions and Policy Response

The Government of Pakistan in collaboration with various non-governmental organizations (NGOs) has implemented many initiatives to combat substance use among youth in Punjab in response to the rising drug abuse crisis. The programs such as the "Youth Awareness and Rehabilitation Program" and Outpatient Opioid Assisted Treatment (OOAT) centers have been established to provide the services for the treatment of this addiction. But in spite of these efforts, there is still a significant gap in the availability of rehabilitation facilities and many individuals remain unaware of these services due to social stigma and geographical limitations. The educational programs that focus on prevention, especially targeting rural areas where drug use is most prevalent are needed for this. Moreover, the enhanced public health campaigns and policy measures are crucial in reducing both the demand for and supply of illicit substances. (Government of Punjab, 2022).

Methodology:

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed to ensure a comprehensive and systematic approach to the literature review involving identification, screening, eligibility, and inclusion.

Identification:

The electronic databases search was conducted using PubMed, Scopus, Web of Science, PsycINFO and Google Scholar using following keywords:

The substance use" or "drug abuse" or "addiction", "young adults" or "youth" or "adolescents", "neurobiology" or "brain function" or "cognitive effects", "socio-economic" or "economic impact" or "social outcomes" & "Punjab". The search was restricted to studies published between 2005 and 2024, written in English, and focused on the population of young adults (aged 15–30) in Punjab.

Screening: A total of 612 articles were retrieved and abstracts as well as titles were screened for relevance based on predefined inclusion and exclusion criteria.

Eligibility: 97 full-text articles were assessed for eligibility.

Included Studies:

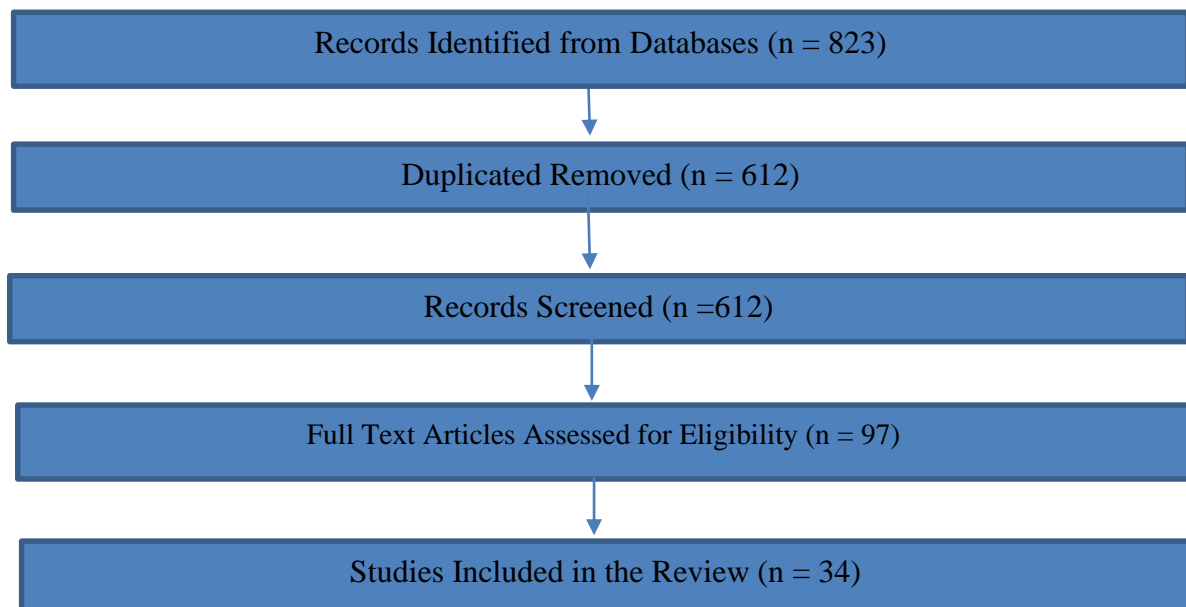
34 studies were included in the final review and 12 focused primarily on neurobiological impacts (e.g., structural brain changes, cognitive impairments) and 14 analyzed socio-economic

outcomes (e.g., employment, education, family dynamics). 8 provided interdisciplinary perspectives combining both aspects.

Explanation of the PRISMA Flow Diagram

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram represents the process of selecting studies for inclusion in a systematic review.

PRISMA flow diagram:



Discussion

Effects of neurobiological substance abuse on youth in Pakistani Punjab are deep rooted affecting critical neurotransmitter systems that regulate mood, cognition and behavior. The neurobiological changes compound the socio-economic struggles faced by youth leading to diminished work productivity, increased crime rates and the strained familial relationships. The burden of neurological and socio-economic challenges necessitates a more integrated approach to treatment, combining medical, psychological and socio-economic rehabilitation strategies as well.

Recommendations

The Expansion of Rehabilitation Facilities:

There is need to increase investment in the rehabilitation centers particularly in rural areas to provide accessible treatment.

More Prevention Programs:

There is a dire need of early intervention programs which should be developed for schools and colleges to educate students about the dangers of substance abuse.

Awareness Campaigns among public:

The role of media and conduction of mass awareness programs to reduce the stigma associated with drug addiction and encourage more individuals to seek help.

Need of Vocational Training:

There is need to provide vocational training for individuals in recovery to enhance employment opportunities and reduce the economic burden of substance use.

Research:

There is need for funding for more longitudinal studies that track the long-term effects of substance abuse on both the brain and socio-economic conditions of youth in Punjab.

Conclusion

The use of substance among young adults in Punjab, Pakistan presents crucial challenges to both individual well-being and social stability. Neurobiological effects of addiction especially the disruption of neurotransmitter systems contribute to both cognitive & emotional impairment, reinforcing the cycle of addiction. Moreover, the social and economic consequences like the unemployment, crime and family disintegration exacerbate the public health burden. A well-structured approach combining medical treatment, socio-economic rehabilitation and community-based interventions is essential to address this growing epidemic.

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