Emerging NPS Trends in Malaysia: Psilocybin Vaping among Individuals with Amphetamine-type Stimulant (ATS) Use Disorder

Ruzmayuddin Mamat (PhD) [1,2,5], Associate Professor Dr. Rusdi Abd Rashid (MD)[2], Dr. Sim Maw Shin (PhD)[1], Associate Professor Dr. Baharuddin Ibrahim (PhD)[1], Associate Professor Dr. Suzaily Wahab (MD)[3], Dr. Azmir Ahmad (PhD)[4] , Nuratikah M Nordin (MPharm)[5]

Faculty of Pharmacy, University Malaya[1]

University Malaya Centre for Addiction Science (UMCAS)[2]

Department of Psychiatry, Universiti Kebangsaan Malaysia Medical Centre (UKMMC)[3]

Kuliyyah of Nursing, International Islamic University of Malaysia (IIUM)[4]

Ministry of Health, Malaysia[5]

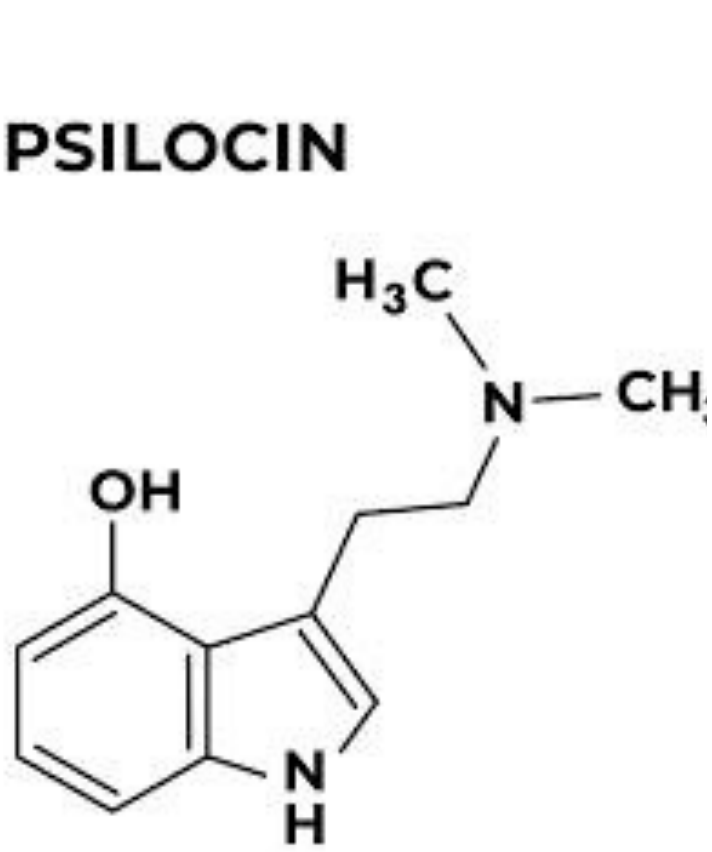
Ministry of Higher Education Malaysia Long-term Research Grant Scheme (LRGS/1/2019/ UKM/02/2/2).
Ethics: NMRR- 21-02456-EJA & MREC-2021714-10375

Overview

- **Introduction/Background**
- **Summarized Literature Review**
- **Research aim and objectives**
- **Materials and Methods**
- **Conclusion/Future remarking**
- **References**

What is Psilocybin?

- Psilocybin, chemically known as 4-phosphoryl oxy-n, n-dimethyltryptamine
- The primary psychoactive, **naturally occurring alkaloid in over 200 species of mushrooms** (Psilocybe species) (Solano et al., 2019; Dominuge et al, 2022)
- As the **prodrug of Psilocin** (4-oh-dimethyltryptamine)
- These compounds act simultaneously and are **related to the endogenous neurotransmitter serotonin**



Dominuques et al., 2022; An Overview on the Taxonomy, Phylogenetics and Ecology of the Psychedelic Genera *Psilocybe*, *Panaeolus*, *Pluteus* and *Gymnopilus*

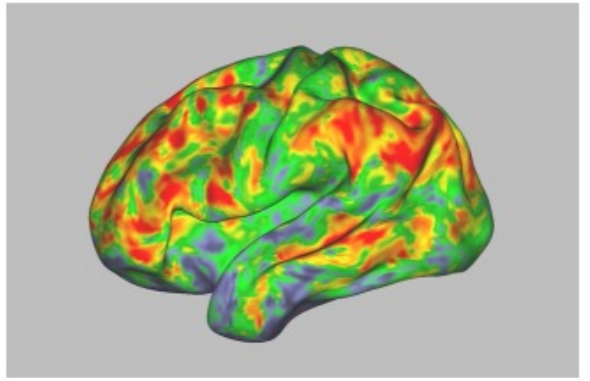
Street Names, Acute Effects & Mental Health Concerns

- The most common street names for psilocybin are **'magic mushroom,' 'shrooms,' or 'booms**' (Terminology And Information On Drugs Third Edition, 2016)
- Under uncontrolled doses the **psilocybin will cause an increase in heart rate, nausea, changes in mood**, and fluctuations in muscle control (Schlag et al., 2022).
- **Risk of depersonalization, derealization & psychosis in prolonged use** → mental illness & suicidal thought (Bienenmann 2020; Passie 2022)

🍄 Psilocybin: Psilocybin: Mechanism, Brain Effects & Psychosis

Mechanism of Action:
Psilocybin → metabolized to **psilocin** → **partial agonist at 5-HT2A receptors**.
Disrupts **default mode network (DMN)** → alters sense of self, time, and space (Siegel et al., 2024).

Glutamate link: 5-HT2A activation on cortical pyramidal neurons ↑ glutamate release → sensory overload, cortical hyperexcitability (Vollenweider & Kometer, 2010).
Dopamine link: downstream modulation of mesolimbic dopamine circuits → contributes to euphoria, paranoia, and psychosis-like features (Kim et al., 2025).



This heat map of brain activity patterns reveals profound disturbance after a dose of psilocybin. Relatively stable patterns before and after the dose (blue and green) are temporarily scrambled by the dose of psilocybin (red, orange and yellow).
Sara Moser/Washington University

Brain Effects:
Causes **functional connectivity (FC) disruption** across cortex, thalamus, hippocampus, cerebellum.
↓ Synchronization **within networks**, ↑ "cross-talk" between normally distinct networks.
Produces **desynchronization and increased entropy** in brain activity → hallucinations, ego dissolution.
FC changes correlate with **intensity of psychedelic experience**.

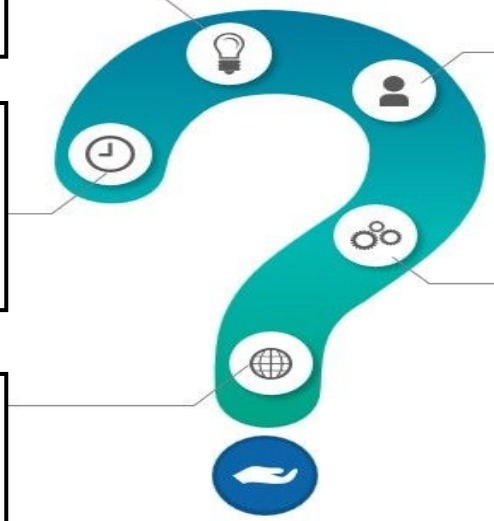
Psychosis Link:
Excessive **5-HT2A–glutamate–dopamine interaction** may mimic **schizophrenia-like symptoms**: hallucinations, delusions, mania-like features.
Risk ↑ in **vulnerable populations** (polysubstance users, bipolar disorder, family history of schizophrenia).

INTRODUCTION: Overview of the study

- The emergence of New Psychoactive Substances (NPS), including synthetic psilocybin & cannabis (UNODC, 2021) & Malaysia (National Poison Centre, 2023 & NADA., 2023)

- The current trend is shifting to the hazardous use of synthetic psilocybin and cannabis in vaping (Adams et al., 2022)

- The use of psilocybin, also known as 'Magic Mushroom,' has gained popularity among Malaysians in regions where ATS and heroin use are prevalent (Hasani et al., 2019)



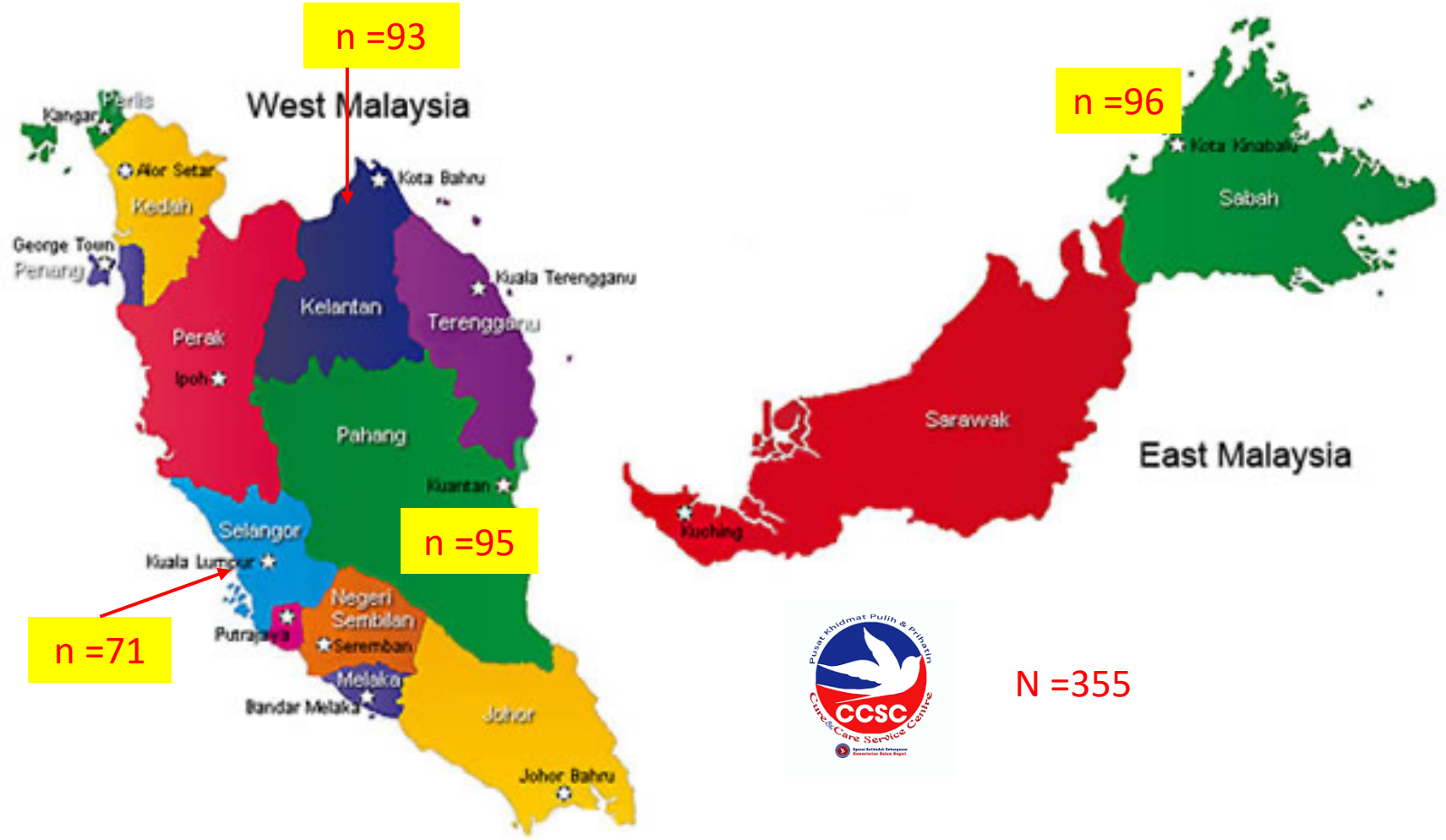
- However, studies on hallucinogen use, including psilocybin in Malaysia, are scarce and poorly documented.

- To assess the prevalence of psilocybin use through vaping and aims to identify the predictors and risk factors of individuals engaged in psilocybin use

WHY WE CONDUCT THIS STUDY?

- A **global increase in illicit substance use in vaping**, such as synthetic cannabis and psilocybin, has been noted in recent years), particularly among youth and young adults (Grant et al., 2019; Vogel et al., 2020; Wu et al., 2006).
- **Increase in drug seizure involving psilocybin in liquid and raw materials**. The Malaysian Royal Police reported tons of mushrooms containing psilocybin were seized between 2020 and 2021 (International Narcotics Control Board United Nations, 2021; Perimbanayagam, 2022
- The **Malaysia National Poison Center also reported cases related to psilocybin poisoning** that had an increase compared to previous years (Samsudin., 2021).

Tabulated demographic for Psilocybin Vaping Study (N=355)



Result & Discussion

Who Are the Psilocybin Vapers?

👦 **Younger → Mean 23 yrs**

Vapers are significantly younger- early working adult

👨 **Male-dominant → 85%**

Consistent with ATS use patterns in detention settings

 **Malay → 73.5%**

Higher exposure due to location and accessibility of-> The golden triangle

💰 **Low income (B40) → 99%**

Socioeconomic vulnerability driving substance use

🧠 **Psych comorbidity → 5.4% schizophrenia**

Mental health and medical vulnerabilities increase risk

Users

🍄 **Psilocybin → 51.3% (mostly via vaping)**

Rapidly emerging as a NPS, especially through vaping

🚬 **Tobacco → 95.8%**

Most common baseline substance

🍺 **Alcohol → 39.6%**

Frequently co-used with hallucinogens

🌿 **Cannabis → 38.9%**

Strong overlap with psilocybin vaping

🌱 **Kratom → 23.1%**

Widely available in Malaysia but less preferred among ATS users

💉 **Opioid → 7.0%**

Use declining due to substitution therapies and stigma around injecting

Key Predictors: What Drives Psilocybin Vaping?

👦 **Younger age → OR ≈ 1.9**
Youth more likely to experiment with vaping

 **Malay ethnicity → OR ≈ 1.6**
Cultural and geographic factors increase exposure

🚬 **Tobacco use → OR ≈ 5.8**
Strong gateway association

🍺 **Alcohol use → OR ≈ 3.1**
Social use overlaps with hallucinogens

🌿 **Cannabis use → OR ≈ 9.2**
Strongest predictor — cannabis users are nearly ten times more likely to vape psilocybin

Why Psilocybin Vaping Matters?

🍄 **New psychoactive substance in Malaysia**

Shifting drug landscape beyond ATS and heroin

📈 **High prevalence (51.3%) among ATS users**

Comparable to alcohol, exceeding cannabis

🧠 **Linked to psychosis and polysubstance use**

Case studies confirm hallucinations, mania, and delusions

🚭 **Emerges in vaping culture, bypassing controls**

Difficult to detect in standard urine drug screens

⚠️ **Urgent clinical & policy relevance**

Requires screening in clinics, stronger surveillance, and youth-focused interventions

Case Study 1: Psilocybin Induce Psychosis

Patient Info:
23-year-old male, university student
No past psychiatric illness.
History of occasional recreational substamce use

Chief Complaint:
“Seeing melting objects and distorted faces after vaping mushroom liquid for 2 days”

History of Presenting Illnesses:
Claims vaping “mushroom liquid” for 3/7.
2-day history of visual hallucinations, including colorful geometric patterns, distorted faces, and objects appearing to melt.
Mild paranoia but no structured auditory hallucinations.
Associated insomnia and anxiety.

Investigations:
Urine drug screen: negative for ATS, opioids, cannabis, benzodiazepines.
Routine labs: normal.

Management in Ward:
T. Olanzapine Zydis 10 mg ON x 3/7 -> switch T. Risperidone 1mg BD
Clonazepam 1 mg PRN X 5/7
Visual symptoms reduced by day 5.
Simplify to **T. Risperidone 2 mg ON** for maintenance.

Discharge Plan:
T. Risperidone 2 mg ON
Psychoeducation on hallucinogen risks.
OPD follow-up in 2 weeks.

Case Study 2: Psilocybin Induce Psychosis

Patient Info:
28-year-old female, Grab Driver
1st psychiatric admission
Family history: schizophrenia (maternal uncle)
History of methamphetamine use for 4 years, abstinent × 1 year

Chief Complaint:
“Hearing voices of angels and seeing mystical figures for 1 week.”

History of Presenting Illness:
Claims vaping “mushroom liquid” repeatedly for 1 week
Visual hallucinations: bright lights, mystical figures
Auditory hallucinations: voices of angels commenting
Developed **grandiose delusions** (“I have a special mission”)
Poor sleep, irritability, absent insight

Investigations:
Urine drug screen: negative for ATS, opioids, cannabis, benzodiazepines
Blood tests: normal

Management in Ward:
Started on **T. Olanzapine Zydis 5 mg OM + 10 mg ON** with **Clonazepam 0.5 mg BD** (3/7)
Switched to **T. Risperidone 1 mg OM, 2 mg ON**
Marked improvement in hallucinations and delusions by day 7
Simplified to **T. Risperidone 3 mg ON** for long-term stabilization

Discharge Plan:
T. Risperidone 3 mg ON
Psychoeducation for patient and family, counseling on relapse risk
Psychiatric outpatient follow-up arranged

🔄 QUICK RECAP

1️⃣ Psilocybin is a potent hallucinogen → produces vivid visual hallucinations (patterns, distorted faces, colors).

2️⃣ High risk of psychosis → especially among substance users, polysubstance users, or those with a family history of schizophrenia.

3️⃣ Manic-like or psychotic features may emerge → euphoria, grandiosity, poor sleep, auditory hallucinations.

4️⃣ Clinical management is critical → antipsychotics (olanzapine, risperidone) stabilize symptoms; relapse prevention and follow-up are essential.

5️⃣ Emerging trend → Psilocybin use through vaping is increasing in Malaysia and worldwide, raising new public health and clinical concerns

📌 STUDY IMPLICATION

1️⃣ Emerging NPS trend → Psilocybin use via vaping is now common among Malaysian ATS users (51.3%), highlighting a shift from traditional drugs to new psychoactive substances.

2️⃣ Psychiatric risk → Psilocybin shows high potential to induce psychosis, particularly in those with substance use history, polysubstance use, or genetic vulnerability (e.g., family history of schizophrenia).

3️⃣ Polysubstance link → Concomitant use of cannabis, alcohol, kratom, and tobacco significantly increases risk, underscoring the need for integrated prevention strategies.

4️⃣ Younger population at risk → Younger ATS users are more likely to experiment with psilocybin vaping, making them a priority group for intervention.

5️⃣ Clinical relevance → Psychiatrists and addiction specialists should screen for hallucinogen use, even when routine urine drug tests are negative

💡 STUDY SUGGESTION

✅ **Clinical Practice:**

Incorporate **hallucinogen use screening** (including psilocybin) into routine addiction assessments.
Enhance training of clinicians to recognize **psilocybin-induced psychosis presentations**.

✅ **Policy & Public Health:**

Develop **targeted prevention campaigns** for youth and polysubstance users.
Strengthen enforcement on **illicit vaping products** containing psilocybin.
Collaborate with the **National Poison Centre & Royal Malaysia Police** to improve surveillance.

✅ **Research & Future Directions:**

Conduct **longitudinal studies** to clarify causal links between psilocybin and psychosis.
Explore **genetic and psychosocial risk factors** (e.g., ATS dependence, family history).
Expand studies to **female populations** and underrepresented groups.
Apply metabolomic approaches to identify **psilocybin metabolites** in biofluids, enabling improved detection, monitoring, and early intervention

Thank You…

Ruzmayuddin Mamat (PhD)
Clinical Pharmacist, Researcher
Ministry of Health, Malaysia
ruzmayuddin@moh.gov.my

REFERENCES

1. Adams, E. A., Spencer, L., Addison, M., McGovern, W., Alderson, H., Adley, M., McGovern, R., Gilvarry, E., Kaner, E., & O'Donnell, A. (2022). Substance Use, Health, and Adverse Life Events amongst Amphetamine-Type Stimulant Users in North East England: A Cross-Sectional Study. *International Journal of Environmental Research and Public Health*, *19*(12). https://doi.org/10.3390/ijerph19126996

2. Barrett, S. P., Darredeau, C., & Pihl, R. O. (2006). Patterns of simultaneous polysubstance use in drug using university students. *Human Psychopharmacology*, *21*(4), 255–263. https://doi.org/10.1002/hup.766

3. Bienemann, B., Ruschel, N. S., Campos, M. L., Negreiros, M. A., & Mograbi, D. C. (2020). Self-reported negative outcomes of psilocybin users: A quantitative textual analysis. *PLoS ONE*, *15*(2). https://doi.org/10.1371/journal.pone.0229067

4. Bogenschutz, M. P., Forcehimes, A. A., Pommy, J. A., Wilcox, C. E., Barbosa, P., & Strassman, R. J. (2015). Psilocybin-assisted treatment for alcohol dependence: A proof-of-concept study. *Journal of Psychopharmacology*, *29*(3), 289–299. https://doi.org/10.1177/0269881114565144

5. Scheibe, A., Young, K., Moses, L., Basson, R. L., Versfeld, A., Spearman, C. W., Sonderup, M. W., Prabdial-Sing, N., Manamela, J., Puren, A. J., Rebe, K., & Hausler, H. (2019). Understanding hepatitis B, hepatitis C and HIV among people who inject drugs in South Africa: Findings from a three-city cross-sectional survey. *Harm Reduction Journal*, *16*(1). https://doi.org/10.1186/s12954-019-0298-2

6. Schlag, A. K., Aday, J., Salam, I., Neill, J. C., & Nutt, D. J. (2022). Adverse effects of psychedelics: From anecdotes and misinformation to systematic science. In *Journal of Psychopharmacology* (Vol. 36, Issue 3, pp. 258–272). SAGE Publications Ltd. https://doi.org/10.1177/02698811211069100

7. Singh, D., Mamat, R. bin, Narayanan, S., & Vicknasingam, B. (2019). Prevalence of Amphetamine-Type Stimulants (ATS) use among clients in primary and private Methadone Maintenance Treatment (MMT) program in Kuantan, Malaysia. *Journal of Substance Use*, *24*(6), 666–671. https://doi.org/10.1080/14659891.2019.1642409

8. Glasner-Edwards, S., & Mooney, L. J. (2014). Methamphetamine psychosis: Epidemiology and management. *CNS Drugs*, *28*(12), 1115–1126. https://doi.org/10.1007/s40263-014-0209-8

9. Grant, J. E., Lust, K., Fridberg, D. J., King, A. C., & Chamberlain, S. R. (n.d.). *E-Cigarette Use (Vaping) is Associated with Illicit Drug Use, Mental Health Problems, and Impulsivity in University Students*.

10. Hasani, W. S. R., Saminathan, T. A., Majid, N. L. A., Yn, J. L. M., Rifin, H. M., Hamid, H. A. A., Lourdes, T. G. R., Ahmad, A., Lsmail, H., Rashid, R. A., & Yusoff, M. F. M. (2021). Polysubstance use among adolescents in Malaysia: Findings from the National Health and Morbidity Survey 2017. In *PLoS ONE* (Vol. 16, Issue 1 January). Public Library of Science. https://doi.org/10.1371/journal.pone.0245593

11. Herbeck, D. M., Brecht, M. L., & Lovinger, K. (2015). Mortality, causes of death, and health status among methamphetamine users. *Journal of Addictive Diseases*, *34*(1), 88–100. https://doi.org/10.1080/10550887.2014.975610

12. *INTERNATIONAL NARCOTICS CONTROL BOARD UNITED NATIONS*. (n.d.). www.incb.org

13. Driezen, P., Nordin, A. S. A., Hairi, F. M., Yee, A., Tajuddin, N. A. A., Hasan, S. I., Danaee, M., Kamaludin, I. S., Kaai, S. C., Yan, M., Grey, M., Quah, A. C. K., Thompson, M. E., & Fong, G. T. (2022). E-cigarette prevalence among Malaysian adults and types and flavors of e-cigarette products used by cigarette smokers who vape: Findings from the 2020 ITC Malaysia Survey. *Tobacco Induced Diseases*, *20*(March). https://doi.org/10.18332/TID/146363

14. Estévez-Lamorte, N., Foster, S., Gmel, G., & Mohler-Kuo, M. (2021). Routes of administration of illicit drugs among young swiss men: Their prevalence and associated socio-demographic characteristics and adverse outcomes. *International Journal of Environmental Research and Public Health*, *18*(21). https://doi.org/10.3390/ijerph182111158

15. Feng, L. Y., Battulga, A., Han, E., Chung, H., & Li, J. H. (2017). New psychoactive substances of natural origin: A brief review. In *Journal of Food and Drug Analysis*