

**AMPHETAMINE TYPE STIMULANTS USE AMONG
METHADONE CLIENTS IN KLANG VALLEY**

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UNIVERSITI SAINS MALAYSIA

2020

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VALLEY**

by

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**Thesis submitted in fulfilment of the requirements
for the degree of
Master of Science**

February 2020

ACKNOWLEDGEMENT

In the name of Allah the Most Gracious and Merciful.

First and foremost, I would like to express my deepest appreciation and gratitude to my supervisor, Professor Dr Vicknasingam Balasingam Kasinather for his invaluable guidance, advice and commitments throughout this study. Also, to my mentor, Dr Darshan Singh, I would like to express my heartfelt appreciation for his tireless help and constant guidance during the study period. It was through their trust and patience that assist me in completing the study. At the same time, I would like to express sincere appreciation and gratitude to Dato' Dr Khalid Ibrahim as the Director of State Health Department of Selangor and Dr Zainudin Bin Abd Wahab as the Director of Health Department of Wilayah Persekutuan Kuala Lumpur and Putrajaya for allowing myself to conduct research in the respective methadone facilities under their jurisdiction, MMT treatment providers from each methadone facilities for the cooperation, officers from National Anti-Drug Agency, and the very supportive staffs and colleagues at Centre of Drug Research, USM for the precious assistance and comments in completing my study. My gratitude also goes to my superiors; Dr Vickneswari Ayadurai and Mr Asmarul Akram Zawawi for their invaluable comments and support. To my respectful colleagues at Taman Medan Health Clinic, I would like to express my gratitude for supporting my course of work and being accommodative during my study leave. Most importantly, I am truly indebted to my husband, Mr Khairul Fizree Abd Aziz who has given so much time, consideration and unconditional support for me to complete this work. A special thanks to my beloved son, Uzair Khairul Fizree; my parents and parents-in law, and all family members for their understanding, support, encouragement, patience and love throughout my study and thesis preparation.

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LIST OF ABBREVIATIONS

ACCORD	ASEAN and China Cooperative Operations in Response to Dangerous Drugs
AIDS	Acquired Immuno-deficiency Syndrome
ASEAN	Association of Southeast Asian Nations
ATS	Amphetamine-type Stimulants
BZO	Benzodiazepines
CBT	Cognitive Behavioural Therapy
CD4	Cluster of Differentiation 4
CI	Confidence Interval
DSM-V	Diagnostic and Statistical Manual of Mental Disorders 5
FDU	Female Drug User
HAART	Highly Active Anti-Retroviral Therapy
HCV	Hepatitis C
HIV	Human Immunodeficiency Virus
IDU	Injecting Drug User
MAT	Medicine Assisted Therapy
MDMA	3,4-methylenedioxyamphetamine
MMT	Methadone Maintenance Treatment
MOA	Mechanism of Action
MOE	Ministry of Education, Malaysia
MOH	Ministry of Health, Malaysia
MOU	Memorandum of Understanding
MSM	Men Having Sex with Men
NADA	National Anti-Drug Agency, Malaysia
NCID	Narcotics Criminal Investigation Department
NGO	Non-governmental Organization
NPS	New Psychoactive Substances
NSEP	Needle Syringe Exchange Program
OR	Odds Ratio
PWID	People Who Inject Drug
QoL	Quality of Life

REM	Rapid Eye Movement
RMP	Royal Malaysia Police
SAMHSA	Substance Abuse and Mental Health Services Administration
SD	Standard deviation
SUD	Substance Use Disorder
UN	United Nations
UNODC	United Nations Office on Drugs and Crime
WHO	World Health Organization

**PENGGUNAAN AMPHETAMINE TYPE STIMULANTS DALAM KLIEN
METADON DI LEMBAH KLANG**

ABSTRAK

Penggunaan “amphetamine type-stimulant” (ATS) sedang menjadi lebih prevalen di kalangan klien dalam program rawatan gantian opiat (OST). Penggunaan ATS semasa program rawatan terapi gantian metadon (MMT) adalah berkaitan dengan hasil rawatan yang rendah. Kajian ini bertujuan untuk memahami konteks penggunaan ATS, persepsi terhadap penggunaan ATS dan ketersediaan komponen psikososial dalam program MMT. Sejumlah 231 responden telah direkrut menerusi persampelan mudah daripada dua fasiliti MMT (kerajaan dan swasta) di Lembah Klang untuk kajian keratan rentas ini. Majoriti lelaki (96%, n=221/231), Melayu (84%, n=194/231), dengan min umur 45 tahun. Purata dos metadon responden adalah 55mg/harian. 29% (n=67/231) telah memulakan penggunaan ATS selepas penyertaan MMT dan purata masa kepada penggunaan ATS yang pertama adalah 27 bulan (SD=26.08). Sebab-sebab umum bagi penggunaan ATS dalam kajian ini termasuk untuk meningkatkan keyakinan, prestasi pekerjaan dan euphoria, disamping untuk mengatasi kesan sampingan penggunaan metadon. Kajian ini mendapatkan bahawa klien dalam program MMT swasta mempunyai kebarangkalian yang tinggi untuk melaporkan penggunaan opiat dalam tempoh 30 hari yang lepas (OR: 1.9: 1.00-3.44; $p<0.048$), dan tiada perbezaan signifikan diantara klien MMT kerajaan dan swasta bagi penggunaan ATS. Klien yang menerima dos metadon ≤ 60 mg/harian mempunyai kebarangkalian yang tinggi untuk melaporkan penggunaan opiat dalam 30 hari yang lepas (OR: 2.1: 1.05-4.19; $p<0.032$). Responden dalam fasiliti MMT kerajaan dan swasta mempunyai kebarangkalian yang sama untuk menggunakan ATS dalam 7 hari ($p<0.068$), dan 30

hari ($p < 0.281$) yang lepas tanpa megira dos methadone. Bagi simptom psikologi, 59% ($n=137/231$) mengalami halusinasi, 55% ($n=125/231$) mengalami kebimbangan dan masalah gangguan tidur (90%, $n=207/231$). Majoriti (75%, $n=173/231$) percaya bahawa penggunaan ATS kurang menyebabkan ketagihan berbanding opiate. Majoriti (95%, $n=74/78$) klien program MMT swasta melaporkan bahawa mereka tidak menerima sebarang kaunseling daripada pegawai farmasi mereka, manakala kedua-dua klien daripada program MMT kerajaan (17%, $n=26/153$) dan swasta (1%, $n=1/78$) mempunyai peratus kaunseling keluarga yang rendah. 69% ($n=143/207$) mengakui bahawa mereka memerlukan bantuan untuk mengurangkan pengambilan ATS. Dapatan daripada kajian ini menunjukkan peningkatan populariti penggunaan ATS, dan juga menitikberatkan keperluan untuk rawatan ATS dalam kalangan klien MMT kerajaan dan swasta di Lembah Klang. Oleh kerana bahaya ancaman penggunaan ATS, pembekal rawatan mesti segera mengambil langkah berjaga-jaga untuk mengawal penyalahgunaan ATS.

**AMPHETAMINE TYPE STIMULANTS USE AMONG METHADONE
CLIENTS IN KLANG VALLEY**

ABSTRACT

Amphetamine-type-stimulant (ATS) use is becoming more prevalent among clients in opiate substitution treatment (OST) program. The use of ATS during methadone maintenance treatment (MMT) is associated with low treatment outcome. This study aimed to understand the context of ATS use, perceptions towards ATS use and the availability of psychosocial components in MMT program. A total of 231 respondents were recruited through convenience sampling from two MMT facilities (primary vs. private) in Klang Valley for this cross-sectional study. Majority males (96%, n=221/231), Malays (84%, n=194/231), with mean age of 45 years, and the average methadone dose was 55mg/daily. 29% (n=67/231) have initiated ATS after MMT enrollment with the mean time to ATS use was 27 months (SD=26.08). The common reasons for ATS use in this study include to improve confidence, enhance work performance, increase euphoria and overcome methadone use side-effects. This study found that clients in private MMT program have higher odds of reporting opiate use in the last 30 days (OR: 1.9: 1.00-3.44; $p<0.048$), and no significant differences between primary and private MMT clients regarding ATS use. Those who received methadone dose of ≤ 60 mg/daily have higher odds of reporting opiates in the last 30 days (OR: 2.1:1.05-4.19; $p<0.032$), and respondents in primary and private MMT facilities have equal odds of using ATS in the last 7 days ($p<0.068$) and 30 days ($p<0.281$) regardless of their methadone dose. As for psychological symptoms, 59% (n=137/231) have experienced hallucination, while 55% (n=125/231) experienced anxiety and sleep disturbances (90%, n=207/231). Majority (75%, n=173/231)

believed that ATS is less addictive compared to opiates, and 95% (n=74/78) of respondents in private MMT program reported that they have not received any counselling from their pharmacist. Both primary (17%, n=26/153) and private (1%, n=1/78) MMT program clients had low percentage of family counselling with 69% (n=143/231) acknowledged that they needed help to reduce ATS intake. Findings from this study show the increasing popularity of ATS use, and also emphasise the need for ATS treatment among primary and private MMT clients in Klang Valley. Due to this imminent ATS use threat, treatment providers must immediately take precautionary measures to contain the abuse of ATS.

CHAPTER 1

INTRODUCTION

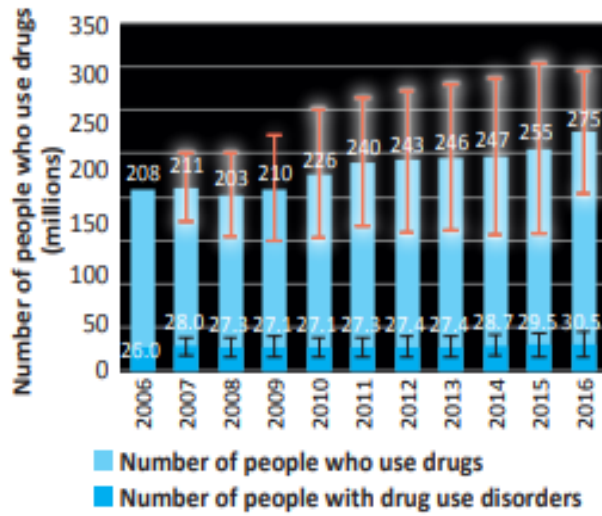
1.0 Introduction

This chapter is the introduction chapter. The world drug abuse problem (e.g. production, trafficking, types of illicit drugs commonly abused globally), Malaysian drug abuse problem, study problem statement, study significance, research questions, study objectives, and study importance are clearly described in this chapter.

1.1 World drug abuse problem

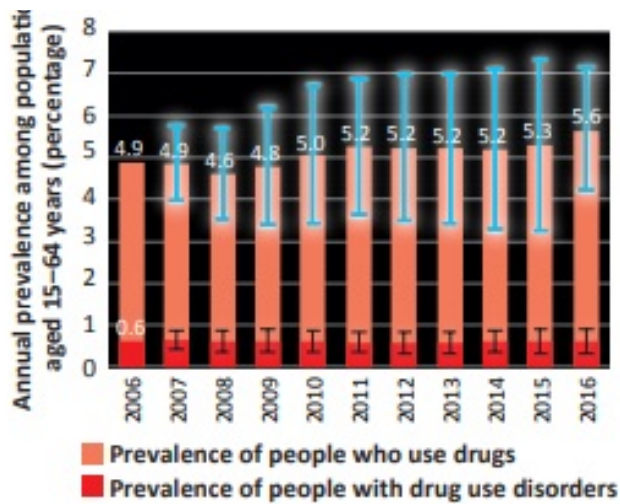
Compulsive, uncontrollable drug use characterizes drug dependence despite clear negative consequences. Drug dependence is a common problem that plagues all ethnic and social classes worldwide. The word "drug" in this study refers to substances under the control of the international drug control conventions namely opiates, cocaine, cannabis, amphetamine-type stimulants (ATS) and new psychoactive substances (NPS), chemical inhalants and prescription drugs. United Nations Office on Drugs and Crime (UNODC) estimated that 1 in 18 people, or a quarter of a billion people between the ages of 15 and 64 years, used at least one drug in 2016 (UNODC, 2018). Of which, 1 out of 9 people (11%) who use drugs suffer from drug use disorders such as drug dependence. Cannabis remained to be the most consumed drug worldwide in 2016 with 3.9% of global population aged 15-64 years old (UNODC, 2018). Although cannabis has the greatest number of consumers, opiates continued to cause the most harm with 76% of deaths in 2015 were implicated due to its disorders, along with people who inject drug (PWID) who endure the greatest health risks. In World Drug Report 2016 by UNODC (UNODC, 2018), it is stated that there is 0.51% to 1 %

prevalence of injecting drug users aged 15 – 64 years old in Malaysia making Malaysia among one of the highest prevalence of injecting drug users in the world.



Source: World Drug Report by UNODC, 2018 (UNODC, 2018).

Figure 1.1 Global trends in estimated number of people who use drugs from 2006-2016.



Source: World Drug Report, 2018 (UNODC, 2018)

Figure 1.2 Global trends in estimated annual prevalence of drug use and people with drug use problems from 2006-2016.

1.2 Malaysian drug abuse problem

In Malaysia, drug dependence has been around since the pre-independence era. Heroin use became a huge problem in the 1980s, when its use was associated with HIV spread among opiate injectors in the country (Zurani et al., 2008). Historically, heroin has been the dominant drug of abuse in Malaysia due to its geographical proximity with the Golden Triangle, i.e., Myanmar, Laos, Thailand (Vicknasingam et al., 2010). Previous rehabilitation programs for drug addicts were yielding little satisfactory results, thus methadone maintenance treatment (MMT) program was introduced in 2005 as part of the harm reduction initiative. The MMT program was jointly introduced by various government ministries namely Ministry of Health (MOH), Ministry of Home Affairs and Ministry of Education (MOE). The Malaysian government also declared that drug addiction is the number one enemy of the country and launched 'drug-free by 2015' policy with the aim of reducing the widespread abuse of illicit drugs in the country (New Straits Times, 2017). Despite billions of Ringgits spent in achieving a drug-free Malaysia by 2015, recent data from the National Anti-Drug Agency (NADA) indicated that this policy has failed to achieve its ambitious plan. The number of drug addicts detected by NADA has also increased from 26,668 in 2015 to 30,855 in 2016 (NADA, 2018).

Recently ATS has become the second most commonly used illicit drug behind cannabis around the world (UNODC, 2018). UNODC indicated that a total of 26 private ATS manufacturing facilities have been crippled in Malaysia, including 18 illegal crystalline methamphetamines labs in 2013. This ATS market appears to be expanding with regard to demand, numerous locations of manufacture and trafficking routes detected, and reflected in a recent data by NADA, that the number of ATS users

has surpassed opiate users by a marked difference (NADA, 2018). In 2016, opiate users were detected at 16,985 cases with ATS users follow behind (13,502 users). However, in 2017 the number of opiate users decreased with 10,154 users, meanwhile the number of ATS users rise in an unprecedented manner. The total number of ATS users detected by NADA was around 15,549, representing 59% of the total drug addicts captured by NADA in 2017.

ATS including crystal methamphetamine or amphetamine containing substance/pills has become prevalent in Malaysia, as well as throughout East and South-East Asia as reported by the Global SMART Program, 2013 and Singh et al., 2013. Despite ATS, heroin abuse has become a major problem in Malaysia and has significantly contributed to HIV spread among opiate injectors in the country. Both opioid and ATS misuse are highly widespread, regularly co-occur and are the primary drivers for the spread of communicable diseases such as HIV and social problems in Malaysia. Those who have poly-drug (e.g. opiate and ATS) use problems may have poor treatment compliance, and this in turn could affect their treatment outcomes. Opiate users generally prefer injecting stimulants (ATS) which is known as “speedball” for its intense euphoric effects (Ellinwood et al., 1976; Wang et al., 2001).

Despite the severity of the ATS use problem, there is no documented information on ATS use prevalence among MMT clients in the country. This consumption is under verbalized by clients and underestimated by carers. At present, there is no data, especially concerning the context of ATS use among MMT clients, their perception towards ATS use, and the availability of psychological treatment services in MMT program. Hence, due to this study limitations, this preliminary study aims to explore the context of ATS use among MMT clients in the country.

1.3 Studies on methadone maintenance treatment (MMT) program

Since Methadone Maintenance Treatment (MMT) program was launched in 2005, numerous studies have been executed to determine the efficacy of the methadone treatment program in the country. The earlier studies mainly investigated the quality of life (QoL) of methadone using clients. Findings from Baharom et al. (2012) showed methadone users have improved QoL in many domains of social functioning. Subsequently, a study by Ali et al. (2016) demonstrated that clients in MMT program in Malaysia are prone to misuse illicit opiates during MMT program. Recently, a study by Dazali et al. (2015) found despite the high treatment cost, clients enrolled on office-based Buprenorphine treatment are being prescribed with low doses of Buprenorphine. Similarly, it is also shown that private GPs who are involved in treating individuals with opiate use disorder or substance use disorder (SUD), failed to strictly adhere to the National MMT guideline. Recently, a study by Ali et al. (2016), found clients enrolled in primary MMT facilities were satisfied with their treatment dose. All these studies mainly determine the QoL and treatment satisfaction. So far, no published studies have investigated the prevalence of illicit drug use particularly ATS (e.g. methamphetamine and amphetamine) among MMT clients in the country.

1.4 Problem statement

Methadone is a synthetic narcotic drug, commonly prescribed as a substitution treatment among people with illicit opioids/opiate use problems. Since opiate use was associated with devastating health repercussions, Methadone Maintenance Treatment (MMT) was first introduced in 1960s during the spread of HIV transmissions among opiate injecting drug users (IDUs). MMT is an evidence-based pharmacotherapy mainly developed to help opiate drug users reduce their dependence, improve social

productivity and reduce harms that are associated with opiate use (Dole & Nyswander, 1965). Patients on methadone would ultimately experience a decrease in opiate craving, which in turn can help them cease from drug seeking behaviours. The rehabilitative services that are commonly offered with methadone treatment program could also provide additional health interventions to opiate users. The use of MMT is increasing rapidly around the globe since numerous studies have shown that methadone can in fact, help reduce or prevent the spread of communicable diseases like human immunodeficiency virus (HIV), and hepatitis C (Darke et al., 2000; Lawrinson et al., 2008). Though methadone is shown to halt infectious diseases spread, many patients who attend MMT program continue to use multiple drugs including opiates during treatment (Dobler-Mikola et al., 2005; Gossop et al., 2002). Several studies have highlighted that clients in methadone program may experience difficulty complying with treatment, since most continue to engage in aberrant drug using behaviours during treatment (Downey et al., 2000). The use of opiates during treatment is also shown to be associated with risky needle sharing behaviours (Lawrinson et al., 2008).

Over the last ten years, the popularity of amphetamine-type stimulants (ATS) continue to increase significantly. Amphetamine-type stimulants (ATS) are the second most widely used illicit drug behind cannabis around the globe (UNODC, 2018). It is estimated that approximately 0.7 percent of the global population (34.2 million people) aged between 15 to 64 years-old, have used ATS in the past-year (UNODC, 2018). Similarly, ATS use trend has ranked behind heroin (Global SMART Program, 2013), and recent findings have identified ATS use as a growing problem in Malaysia (Singh et al., 2013). ATS is a psychoactive substance that consists of amphetamine-group substances and ecstasy-group substances. The abuse of ATS especially amphetamine

and methamphetamine among clients in MMT program is becoming more widespread. ATS is recreationally used for various purposes, however it is commonly used for enhancing work productivity and to heighten euphoria or the effects of other illicit drugs (Degenhardt et al., 2010). Methamphetamine is highly addictive and is reported to cause significant health threats including HIV spread (Degenhardt et al., 2010). Moreover, ATS use is also linked with unsafe sexual behaviours (e.g. having multiple male and female sex partners, decreased condom use, etc.) (Degenhardt et al., 2010). Findings from a local study in Malaysia found roughly 60% of opiate injectors reported lifetime ATS use, while 29% have lifetime history of ATS injection (Vicknasingam et al., 2010).

Despite the lack of documented information on the misuse of ATS among clients in MMT program, this preliminary study aims to determine severity of the ATS use prevalence among clients enrolled in primary and private MMT facilities in Klang Valley, Malaysia. As a result of this study limitation, the key emphasis of this study was to gauge the severity of the ATS use problem among MMT clients, so that appropriate measures or interventions can be implemented to cater to the treatment needs of methadone clients with ATS use problem. This is because concomitant use of ATS with methadone is reported to cause deleterious health consequences, adverse psychological problems, and may ultimately affect MMT efficacy (Degenhardt et al., 2010).

1.5 Study significance

In Malaysia, ATS use context have not been comprehensively investigated. At present, there is no adequate information on the growing ATS use problem in the country. The paucity of information makes it even harder for health care providers and enforcement agencies to develop interventions for ATS users. The only available data on ATS use in the country is on ATS seizures often provided by drug enforcement agencies (NADA). Previous studies chiefly concentrated on social functioning of MMT clients. To date, no studies have investigated the severity of the ATS use problem among clients in both primary and private MMT program in the country. Though clients in MMT program are offered various health care services, there could be a possibility that some of the current available ancillary services may not cater to the treatment needs of MMT clients. Since ATS use is reported to be prevalent among MMT clients, it is vital that a preliminary study is being conducted to determine the context and severity of the ATS use problem among clients in MMT program in the country. It is hoped that findings from this preliminary study can provide significant information to health care providers in MMT program in the country, so that proper measures can be implemented to curb the abuse of ATS among methadone clients.

1.6 Research questions

The study research questions were formulated based on field work observations carried out prior to the study data collection process, and literature review findings. The followings are the study research questions.

1. What are the reasons for ATS use among clients in MMT program in Klang Valley?

2. What perceptions MMT clients have towards ATS use in MMT program in Klang Valley?
3. What are the physical and psychological effects of ATS use among MMT clients in Klang Valley?
4. What types of psychosocial interventions MMT clients receive for their ATS use in MMT program in Klang Valley?

1.7 Study objectives

The followings are the study objectives. The study objectives were developed based on the study research questions.

1. To identify reasons for ATS use among clients in MMT program in Klang Valley.
2. To evaluate client's perceptions towards ATS use in MMT program in Klang Valley.
3. To identify the physical and psychological effects of ATS use among MMT clients in Klang Valley.
4. To determine the types of psychosocial interventions receive by MMT clients for their ATS use in MMT program in Klang Valley.

1.8 Study importance

MMT program is shown to be cost-effective in reducing the health care burden, which is associated with the opiate abuse problem in the country (Naning et al., 2013). MMT program is anticipated to prevent 6,787 new HIV cases from 2013 to 2023, and 38,092 new HIV cases for the next 50 years; and help save RM 41.56 million in next 10 years, and RM 265.11 million for the next 50 years (Naning et al., 2013). Although MMT is shown to be effective in reversing HIV spread, MMT program should not only limit itself to HIV prevention, but find ways or alternatives to address the imminent use of poly-drugs or ATS among clients in MMT program in the country.

This study findings have numerous benefits. First, health care providers can use this study findings to introduce proper or suitable ATS prevention strategies. Next, proper ancillary services can be made available to help methadone clients deal with their concomitant ATS use problem during MMT program. Third, treatment providers can organise programs to provide proper education on the danger of ATS use to MMT clients. Fourth, understanding the context of ATS use among clients in MMT program can also help health care providers to remain alert on ATS use problem. Fifth, policy makers as well as relevant stakeholders can use this study findings as a guide to develop national level strategies to prevent the widespread ATS use problem among clients in MMT program in the country. Last but not least, findings from this study can also be used to develop prospective studies to look at the ATS use problem from different critical areas where urgent data is needed to investigate MMT users who use ATS during methadone treatment. As a whole, findings from this study show MMT providers must immediately take drastic measures to curtail the ATS use issue among clients in both primary and private facilities in the country.

1.9 Conclusion

The world drug abuse and Malaysian drug abuse problems, study problem statement, study significance, research questions and study objectives have been extensively delineated in this chapter. The next chapter is the literature review chapter. The outline of the remaining chapters of the thesis is described below.

The second chapter is the literature review chapter. Relevant local and international articles, articles on MMT program, pharmacological properties of methadone and ATS use, as well as other articles deemed suitable to the scope of study were reviewed.

The third chapter is the study methods chapter. The study design, study population and location, study inclusion and exclusion criteria, data collection process, sampling and sample size, pilot-study, study measures, study ethics, privacy and data confidentiality and statistical analysis are clearly described in this chapter.

The fourth chapter is the results chapter. In this results chapter, respondent's socio-demographic characteristics, followed by illicit drug use, reasons for ATS use, self-reported psychological and physical effects of ATS use, and their perceptions regarding ATS use and psychosocial interventions in MMT program are clearly delineated.

The fifth chapter is the discussion chapter. In this chapter, the socio-demographic characteristics of the sample, current medical status (e.g. HIV, hepatitis B and C status), current illicit drug use history and methadone treatment history with relevant articles related to MMT program in the country are discussed. The prevalence of illicit drug use among clients in primary and private MMT settings and the

association of methadone dose with frequency of illicit drug use, reasons and perceptions for ATS use, and psychological interventions in MMT facilities are also discussed.

The final chapter is the conclusion chapter. A summary on the key findings of study, study significance, study limitations and suggestions for future studies are clearly delineated.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This is the literature review chapter. Relevant articles deemed appropriate to the scope of study has been reviewed, and their findings are comprehensively illustrated in this chapter.

2.1 Demographic of problem drug users in Malaysia

The clinical feature of problem drug use has been defined by National Institute of Drug Abuse (NIDA, 2019) as a chronic relapsing brain disease characterised by compulsive drug seeking behaviours and use that is often difficult to control, despite harmful consequences (NIDA, 2019). Latest report from National Anti-Drug Agency (NADA) showed there was a significant decreased in the number of problem drug users in 2017, compared to the previous years in the country (NADA, 2018). The total number of problem drug users decreased from a total of 30,844 in 2016 to 25,922 (a 15.9% decrement). Among the number of cases identified, a staggering 18,440 (71.1% of total drug addicts detected in 2017) were new users (a decrement of 19.5%) compared to 22,923 for the same period in 2016. The repeat users identified in 2017 also showed a decrease of 5.5% compared to the previous year with 7,482 in 2017, and 7,921 repeat users in 2016 (Table 2.1).

Table 2.1: Comparison of drug users identified between 2016 and 2017 (NADA, 2018)

Case status	Jan – Dec 2016	Jan – Dec 2017	Difference 2016/2017
New user*	22,923	18,440	(-) 19.5%
Repeat user**	7,921	7,482	(-) 5.5%
Total	30,844	25,922	(-) 15.9%

* Detected for the first time by NADA

**Previously detected by NADA

2.1.1 Comparison by state

Amongst all the states in Malaysia, NADA (2018) reported that the state of Penang has the highest number of problem drug users detected in 2017 (3,844 drug users), followed by Kelantan (3,700), Kedah (2,655), Selangor (2,375), and Johor (2,108), respectively. Compared to the 2016 data from NADA, all states recorded a decreased in the number of detected drug users, except for Kelantan, Terengganu, Sabah and Wilayah Persekutuan Labuan.

2.1.2 Comparison by gender

Amongst of the 30,844 problem drug users detected in January to December 2017, 96.2% were male (24,926), and the remaining 3.8% were female (996). Compared to 2016 data, there is a noted decrease for both male and female users with 15.9% and 15.8% decrement respectively in 2017.

2.1.3 Comparison by ethnicity

According to NADA, majority of the problem drug users who were detected in 2017, comprised of the Malay ethnic group 20,956 (91.4%), which consist of 0.1% of the total Malay population in the country (20.07 million). While the following percentages were comprised of Chinese (7.5%), and Indians (6.8%) respectively.

2.1.4 Comparison by age group

NADA (2018) reported that of all the problem drug users identified, >40 years old age group were the biggest group (24.7%), followed by 30 - 34 years old age group (18.6%) and 25 - 29 years old age group (18.3%) and 20 - 24 years old age group (18.1%), and lastly 1,372 (5.3%) are teenagers (13 - 19 years old).

2.1.5 Comparison by occupation

Majority of problem drug users captured in 2017 are employed (21,797 or 84%), and 1% consisted of students (281 drug users). The report also shows that odd-job workers/part-time workers constitute the most significant drug abuse population (8,173 or 31.5%), followed by general workers (5,416 or 20.9%), followed by employees in the servicing industries (6.7%), sales (6.6%) and farming (5.5%).

2.1.6 Comparison by the level of education

The 2017 report showed that the majority of drug users has MCE/SPM/STPM (9,311 or 35.9%) academic qualification. Followed by 35% (9,082 drug users) received minimum LCE/SRP/PMR/PT3 qualification. Meanwhile, 9.1 % completed primary school and 14.4% did not receive any formal education.

2.1.7 Comparison by types of drugs used

NADA (2018) reported that ATS (methamphetamine, amphetamine and ecstasy) has surpassed opiate as the mostly used drug (15,549 or 60%), with crystalline methamphetamine as the most popular form of ATS used (67%), followed by methamphetamine tablets (28%), amphetamine and ecstasy pills (4.9%). Opiate drug group has become the second most used drug with 40% of total drug used (a decrease

from 2016 data by 40%). Meanwhile, marijuana only constituted of 4% of drug used in 2017.

2.1.8 Comparison by reasons of starting drug use

There were various reasons for starting drug use as reported by NADA (2018). The main reason of starting drug abuse gathered in the 2017 data is due to friend/peer influence (62.5%), followed by curiosity (18.5%), for pleasure (12.8%), and stress (4.6%). Other reasons include as pain reliever, as stimulant, ignorance and an inadvertent usage (NADA, 2018).

2.2 Drug seizures data in Malaysia

Federal Police of Narcotics Criminal Investigation Department (NCID) announced nearly RM200 millions of drugs were seized in 2017, which comprised of both traditional and synthetic drugs. According to NCID data, Royal Malaysian Police (RMP) has made about 163,931 drug-related arrests, in which 95% of the arrestees were locals. From the arrest's figures, 24,045 were detained for drug trafficking, 57,284 for drugs possession, and 82,602 for being tested positive for illicit drug use (New Straits Times, 2017). Among the synthetic drugs seized consisted of 1,984kg of crystal methamphetamine, 394kg of ketamine, 268,361 ecstasy pills, 908,015 amphetamine pills, and 2,752,122 benzodiazepine (Erimin-5) pills. Meanwhile, some of the traditional drugs seized comprised of 1,864kg of cannabis or *ganja*, and 445kg of heroin (RMP, 2018a). The most commonly seized ATS types include crystal methamphetamine, ecstasy powder, ecstasy and *yaba* pills; while a marked drop was also recorded for liquid methamphetamine seizure (Table 2.2).

Table 2.2 Comparison of ATS seized between 2016 and 2017 (NADA, 2018)

Drug type	Jan – Dec 2016	Jan – Dec 2017	Difference 2016/2017
Crystal methamphetamine (kg)	653.79	1,258.33	(+)63.23%
Liquid Methamphetamine kg)	1,215.31	353.95	(-)109.78%
Ecstasy powder (kg)	111.84	430.56	(+)117.52%
Ecstasy (pills)	183,133	268,361	(+)37.75%
Yaba (pills)	895,499	908,015	(+)1.39%

Meanwhile, drug seizures obtained from clandestine drug labs in 2017 shows decrement for most drugs from data captured in 2016 (RMP, 2018b). In 2016, a total of 1,213kg of methamphetamine was seized, only 247kg were taken in 2017 as little methamphetamine is produced in small labs, but imported from neighbouring countries.

2.3 Legal frameworks towards illicit drug abuse and trafficking

Combating drug use problem requires collective efforts from various governments. Many agreements and legal frameworks have been established globally towards eradicating the illicit drug use problem (UNODC, 2013); Among some of the frameworks include;

International framework;

- a. United Nations Drug Control Conventions (1961, 1971, 1988).
- b. Global Assessment Program (1998).
- c. ASEAN Plan of Action on Drug Abuse Control (1996).
- d. ASEAN and China Cooperative Operations in Response to Dangerous Drugs (ACCORD) Plan of Action (2000).
- e. Memorandum of Understanding (MOU) on Drug Control (1993).
- f. Sub regional Action Plan (2000).

- g. Tokyo Conference on ATS (2000).
- h. 28th Meeting of Heads of National Drug Law Enforcement Agencies, Asia and the Pacific, in Bangkok (2004).
- i. Regional Government Responses.

Malaysia's initiative and drug-related legal offenses;

Malaysia is also involved in drug eradication efforts. Internationally, Malaysia is a party to the 1988 United Nations Drug Control Convention, a member of the ASEAN and also a member of the ACCORD Plan of Actions. Besides that, Malaysia have also implemented drug laws to contain drug use menace (Pemadam, 2011). Among some of the commonly used drug laws in Malaysia include;

- a. Dangerous Drugs Act 1952.
- b. Poisons Act 1952.
- c. Drug Dependents (Treatment and Rehabilitation) Act 1983, Amendment 1998.
- d. Dangerous Drugs (Special Preventive Measures) Act 1985.
- e. Dangerous Drugs (Forfeiture of Property) Act 1988.

Recently, Malaysia has also launched new national drug policy which covers various aspects such as possession, use, trafficking, prevention and rehabilitation and law enforcement (Astro Awani, 2017). The revamped drug policy is anticipated to provide proper treatment access and legal protection to illicit users in treatment.

2.4 What is methadone?

Methadone was clinically introduced to help opiate users abstain from illicit opiate use. Methadone was first discovered by German scientists for its analgesic efficacy. After World War II, German scientists began synthesizing methadone due to morphine shortage, and the high demand for analgesics (SAMHSA, 2001). Subsequently, methadone became popular among opioid users because it can be used as an alternative treatment to opioids. After many clinical trials, two prominent scientists; Dr Vincent P. Dole, and Dr Marie E. Nyswander managed to successfully develop methadone in 1964. During the initial stage of evaluation, people with opioid use disorder were treated at the Rockefeller University with methadone (SAMHSA, 2001).

Methadone is a synthetic analgesic that has similar pharmacological properties as morphine and heroin (The National Alliance of Methadone Advocates, 2002). There are significant differences between heroin and methadone. Heroin is known as diacetylmorphine (a morphine molecule with two acetyl groups attached). It is derived from morphine, by reacting morphine with acetic anhydride; which give rise to making heroin (a semi-synthetic opiate), it is lipid-soluble and can easily cross the blood-brain barrier. Methadone as a synthetic opiate, has a different chemical structure from the naturally occurring opiate (e.g. morphine and heroin). Hence, methadone effects can differ from morphine and heroin effects (The National Alliance of Methadone Advocates, 2002). Below is the chemical structures of morphine, heroin and methadone.

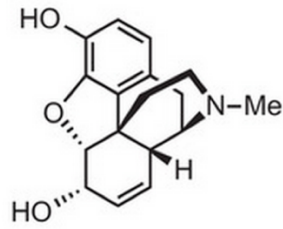


Figure 2.1 Chemical structure of morphine (adapted from U.S. National Library of Medicine, 2018).

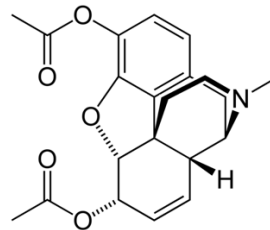


Figure 2.2 Chemical structure of heroin (adapted from U.S. National Library of Medicine, 2018).

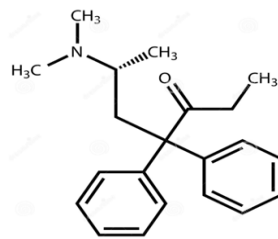


Figure 2.3 Chemical structure of methadone (adapted from U.S. National Library of Medicine, 2018).

Methadone is not similar to morphine and heroin since the compound's main steric bulk that is being lowered for the purpose of reducing methadone's time in the body (The National Alliance of Methadone Advocates, 2002). Methadone's half-life varies significantly between individuals, and the variation is often caused by the expression of cytochrome P450 3A4 (i.e. the main isozyme responsible for methadone's metabolism) (Holmquist G. L., 2009). One of the main characteristics of methadone is that it will not induce a high or euphoric effect. This is because methadone's concentration in blood levels peak slowly, taking as long as ten hours in some individuals (Holmquist G. L., 2009). Methadone is also a weak inhibitor of

cytochrome P450 2D6, which can decrease tolerance induction by other opiates (Wu et al., 1993). Another crucial feature of methadone is it can help to prevent withdrawal and craving symptoms (The National Alliance of Methadone Advocates, 2002).

2.5 Pharmacology of methadone

Pharmacology is the study of drugs' composition, pharmacokinetics, pharmacodynamics, therapeutic use and toxicology. By studying the pharmacology of methadone, one can understand how methadone acts as an important pharmacotherapy option in opiate treatment. Firstly, methadone has an effect onset of 30 minutes and it peaks approximately 3 hours after consumption. Methadone has prolonged half-life of approximately 24 hours, and is able to reach stabilization in 3 to 10 days (Preston A., 1999). Because of its half-life property, methadone can be taken as a single dose daily.

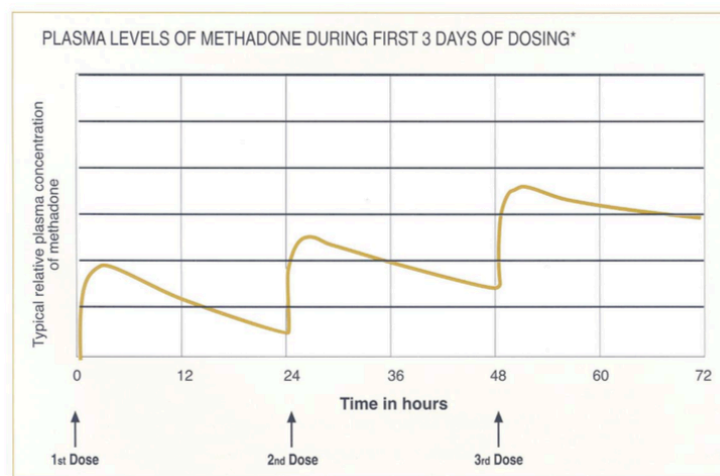


Figure 2.4 Plasma levels of methadone during the first three days of dosing (adapted from Preston, 1999).

Methadone has a high oral bioavailability of around 90%, and the remaining 10% is eliminated unchanged (Preston A., 1999). Methadone has a high lipid solubility and rapidly transfer to tissue especially liver, kidneys, lungs and brain. It is also highly bound to plasma protein particularly α 1-acid glycoprotein, albumin and lipoproteins.

The unbound or free portion is the pharmacologically active portion. This extensive protein binding property gives rise to methadone's gradual and long duration of action (Ferrari et al., 2004; Preston A., 1999). Methadone's inactive metabolites are usually excreted in urine and faeces, while 10% secreted in sweat and saliva (Preston et al., 2003). Average elimination rate of methadone is 35 hours, but it varies from 15 to 60 hours depending on each individual. This then leads to an accumulation of plasma methadone that will occur with repeated administration (Preston et al., 2003).

When an individual is maintained on an optimum methadone dose (usually 60 to 120mg), the dose is able to suppress withdrawal, as well as craving for about 24 hours without inducing euphoria and sedation (Degenhardt et al., 2010). Subsequently, individuals can function without any problems in social functioning.

Table 2.3 Heroin versus methadone

	Heroin	Methadone
Route of administration	Intravenous	oral
Onset of duration	Immediate	30 minutes
Duration of action	3 – 6 hours	24 – 36 hours
Euphoria	First 1 – 2 hours	none
Withdrawal symptoms	After 3 – 4 hours	After 24 hours

2.6 Methadone maintenance treatment (MMT) program in Malaysia

To prevent opioid overdose deaths and HIV spread, Methadone Maintenance Treatment (MMT) was first introduced in the 1960s by Dr Dole and Dr Nyswander. Methadone was reported to help opiate (e.g. morphine and heroin) users reduce their dependence on opiate, improve social productivity and minimise harms that are associated with illicit opiate use in the United States (Dole & Nyswander, 1965; Hall et al., 1998; Joseph et al., 2000). Clients who are maintained on sufficient methadone dose are expected to abstain from illicit drug using behaviours. Despite the availability of methadone treatment, clients in MMT program can also access different ancillary services. In order to minimise opiate use harms, MMT program has been widely made available in many different countries including Southeast Asia (Darke et al., 2000; Lawrinson et al., 2008).

In Malaysia, heroin use has significantly contributed to the rise in HIV prevalence, particularly among opiate injectors. The rise in HIV incidents can be attributed to the risky needle sharing and sexual behaviours of IDUs (Ali et al., 2016). Prior to the implementation of methadone maintenance treatment (MMT) program in the country, a working group known as the “Harm Reduction Working Group” was established in 2004. The working group was tasked to look into measures that can be implemented to address the unabated health problems that were associated with opiate use threat. During the initial phase of MMT services availability, many governments viewed MMT program as a security measure instead of a health care intervention. Since it was thought to compromise the nation's goal of becoming a drug-free country (Reid et al., 2006, UNAIDS and UNDCP, 2000). However, since many NGOs and medical bodies continue to pressure the government to implement harm

reduction program, methadone was finally introduced in Malaysia as a pilot project in 2005.

The aim of methadone or MMT program is to reduce opiate use harms or health risks that is associated with opiate use. MMT program is not a curative program, however it is usually accessed among opioid users seeking to abstain from illicit drug use. Instead, methadone is a form of treatment commonly used among people with opioid use disorder (Ali et al., 2016). In most MMT facilities, comprehensive services are often offered where clients have access to psychological counselling, health education, and treatment referral apart from the daily dosing of methadone.

MMT program was finally introduced in Malaysia in 2005. The program has now expanded to 475 centres which include government hospital and clinics, NADA, prisons and private institutions (Ministry of Health Malaysia, 2016). A total of 85,626 patients has registered into MMT program until the end of December 2015. The rate of new HIV cases has decreased from 26.97 per 100,000 populations in 2003, to 10.92 per 100,000 populations by 2015. The number of HIV cases through IDU has demonstrated a large decrement from 4,478 cases (69.7%) in 2004 before the implementation of the MMT program to 561 cases at 16.8%. The integrated Bio-Behavioural Surveys conducted by the Ministry of Health also showed a decrease in HIV prevalence among the drug injection users from 22.1% in 2009 to 18.9% in 2012 and 16.3% in 2014 (Ministry of Health Malaysia, 2016). The government's investment in the program is also very cost effective (Naning et al., 2013). The MMT program has proven to prevent 1,597 new HIV infections from 2000 to 2015 and save RM 3.85 million (Naning et al., 2013).