A Three Year Study on Drug Abuse Tests at Hospital Tengku Ampuan Rahimah (HTAR), Selangor Malaysia

Lee Seow Phing¹
¹Hospital Tengku Ampuan Rahimah (HTAR), Klang

Correspondence: Lee Seow Phing (leesp@moh.gov.my)

Abstract

This study focused on drug epidemic in Selangor for 3 consecutive years (2016-2018). Hospital Tengku Ampuan Rahimah (HTAR) analysed an estimate of 12988 samples for drug abuse (opiates and cannabinoids) from 2016 until 2018. Being the centre for receiving samples collected by Police and National Anti-Drug agencies in Southwest Selangor, these areas were combed for analytical study of habitual abusers, their age-related patterns and ethnic origins for better understanding and planning for advocates of control.

Keywords: drug abuse, drug abuse tests, Opiates, Cannabinoids

Introduction

This study focused on drug epidemic in Selangor for 3 consecutive years (2016-2018). Hospital Tengku Ampuan Rahimah (HTAR) analysed an estimate of 12988 samples for both opiates and cannabinoids for 3 years (2016 until 2018) from samples collected by Police and National Anti-Drug agencies. Retrospectively, the area under HTAR were combed for analysis of habitual abusers, age-related patterns and their ethnic origins.

Data is dependent on samples collected by the authorities involved in drug control like the police force, National Drug Agencies/AADK (Agensi Anti-Dadah Kebangsaan), a small study with some benefit of data for the purpose of many relevant bodies interested in combating drug abuse. Data was ample to meet requirements of statistical analysis and confirm trending in certain areas in Selangor.

The WHO (World Health Organization) has classified Drug Abuse as a global burden after obtaining data from countries with large human suffering and predicaments resulting from drug abuse. Drug abuse, is a worldwide epidemic and it did not differentiate developed nations or otherwise. While dwelling on reasons for spread it is important to understand the counts in our own area for more effective control by law enforcement and awareness through continuous education.

Background and significance at Hospital Tengku Ampuan Rahimah (HTAR)

Hospital Tengku Ampuan Rahimah’s (HTAR) Chemical Pathology laboratory conducts analytical runs on 2 types of abused drugs like Opiates (Morphine) and Cannabinoids (11-nor-delta9-tetrahydrocannabinol-9 carboxylic acid/THC). This study focusses on a large collection of data
generated over 3 years from 2016 until 2018. Data was effectively collected and maintained through strict confidentiality throughout the period of study. The drug laboratory is a prohibited area where only designated staffs are allowed access within the corridors of Chemical Pathology Unit. This ensures the safety of exhibits, protecting the “chain of custody” at all times as the whole cycle from reception to disposal of these exhibits would in due course be subjected to medical litigation. The Dangerous Drugs Act, DDA 1952 and Evidence Act, 1950 are main Malaysian laws governing drug abuse activities. As sampling are litigious under criminal content, the burden of proof indirectly falls onto the shoulders of those involved in the generation of results. Generating a 3-yearly estimate of 12,988 reports, nearly 50% failed the drug tests. This laboratory has been subjected to many internal and external audits (ISO 15189, ISO 9000) besides having participated in National Drug Quality Control Programmes (NDQCP) to ensure quality and consistency in its reports.

Two types of analysis were designed at the laboratory, its conception nearly 25 years ago, where methods regarding first line screening followed by an economical method of Thin Layered Chromatography (TLC) was defined by the Institutes of Medical Research for all laboratories under the purview of Ministry of Health.

**Methods**

**Drug analysis**

There are 2 distinct protocols, the first being a screening method which deploys a chemistry analyser. The positive subjects from here are further transferred to the second section for further stringent processes in the confirmatory tests.

**Screening (Enzyme Multiplied Immunoassay Technique)**

We utilize Siemens Viva-E which operates on Enzyme Multiplied Immunoassay (EMIT) platforms. It is semiquantitative with urine level cutoffs at 300ng/ml for Opiates and 50ng/ml for Cannabinoids. The assay is designed for quantifying sampled drug in competitive binding with synthetically labelled drug- enzyme glucose-6-phosphate dehydrogenase (G6PDH) at antibody binding sites.

The 300ng/ml opiate calibrator is used as a reference for distinguishing “positive” from “negative” specimens. A specimen that gives a lower absorbance from the cutoff is interpreted as negative. A positive result indicates the presence of opiates but does not measure levels in intoxication. Goals for analytical performance with EMIT immunoassays were set at (coefficient of variation, CV<20%) by the Substance Abuse and Mental Health Services Administration (SAMHSA) (Luzzi et. al.2004). This precision goal has been constantly maintained at this laboratory in Hospital Tengku Ampuan Rahimah.

Opiate and Opioids are different structurally though they result in significant toxicities and clinical problems. Wu et.al.(2003) described the confusion when physicians expect the immunoassay request for opiates to result in any opioids detection. The assay detects free morphine and have various degrees of cross activity with codeine,6-monoacetylmorphine(6-MAM), oxycodone and hydromorphone conjugates.

Further confirmation by another method to differentiate the same group but structurally dissimilar compounds would not be the scope in this study. On a similar vein, challenging adulterants in the form of synthetic opioids and cannabinoids are escaping current detection limitations.

**Confirmation (Thin Layer Chromatography)**

The positives in screening tests would be confirmed by the tedious Thin Layer Chromatography (TLC) manual method. It takes almost 2 days and 3 final processes in a)Hydrolysis b)Extraction c)Chromatography to obtain results in thin-layer chromatographic form. Interpreting chromatograms requires training and skill.
Design

A prospective study and collection of data for 3 years from 2016 until 2018 was conducted. The laboratory receives samples from another party (Police, Narcotic agencies) therefore no consent form was issued. This is a statistical study based on samples collected by the authorities. The privacy of personal data is protected as the data collection worksheet does not capture names or identity numbers.

Inclusion criteria

The laboratory receives samples from Selangor Police and National Anti-Narcotic Agencies(AADK). Data will be analysed according to settings by area, race, age, and types of drug abused. The areas captured are Klang, Shah Alam, Subang Jaya, Petaling Jaya, Sungai Buloh, Sabak Bernam, Kuala Selangor and Kuala Langat. Malaysian male and female subjects were categorized chronologically from the year born ex:1950s,1960s till 1990s tallying to their age groups in Group 1(61-70 years old) Group 2 (51-60 years old), Group 3 (41-50 years old), 4 (31-40 years old), Group 5(21-30 years old) and teenagers.

Results

Retrospectively, there were 4866 positive cases identified in 2016. An estimated 12988 samples were identified by the end of the project. Positive data from monthly analysis were treated to further study on its prominence by popular areas as sampled by authorities, types of drug abused, age groups and race in the state of Selangor.

Data is dependent on Police and their agencies and the laboratory has no control over the amount of positive cases. In year 2016 a total of (4866) cases were identified. The trend lowered the following year in 2017 (3974) and increased in 2018 (4148).

![Figure 1: Monthly data from 2016 until 2018 (Opiates)](image-url)
Table 1: Monthly positive data for Opiates and Cannabinoids and Total collection (2016-2018)

|       | 2016 | 2017 | 2018 | 2016 | 2017 | 2018 | 2018 | Combined |
|-------|------|------|------|------|------|------|------|----------|
| Jan   | 165  | 258  | 140  | 564  | 30   | 62   | 31   | 123      | 289     | 622    | 369    | 1280   |
| Feb   | 38   | 81   | 164  | 281  | 36   | 26   | 47   | 109      | 341     | 246    | 412    | 999    |
| Mar   | 163  | 141  | 131  | 467  | 31   | 49   | 30   | 115      | 427     | 417    | 888    | 1244   |
| April | 152  | 123  | 169  | 444  | 53   | 54   | 41   | 148      | 327     | 263    | 325    | 915    |
| May   | 228  | 177  | 127  | 472  | 59   | 47   | 54   | 160      | 510     | 311    | 319    | 1140   |
| Jun   | 161  | 98   | 81   | 322  | 49   | 41   | 13   | 103      | 368     | 212    | 172    | 752    |
| July  | 147  | 137  | 130  | 414  | 44   | 38   | 48   | 130      | 343     | 311    | 402    | 1056   |
| Aug   | 209  | 138  | 146  | 513  | 72   | 43   | 53   | 168      | 570     | 404    | 373    | 1346   |
| Sept  | 201  | 97   | 158  | 456  | 55   | 35   | 50   | 140      | 358     | 281    | 431    | 1070   |
| Oct   | 289  | 134  | 8   | 412  | 44   | 37   | 24   | 105      | 450     | 297    | 465    | 1207   |
| Nov   | 207  | 161  | 114  | 489  | 45   | 34   | 39   | 139      | 417     | 376    | 233    | 1029   |
| Dec   | 156  | 99   | 94   | 343  | 25   | 45   | 28   | 98       | 466     | 212    | 273    | 951    |
| Total | 2144 | 1599 | 1463 | 5206 | 543  | 531  | 458  | 1332     | 4866    | 3974   | 4148   | 12988  |

Figure 1 & 2 and Table 1 shows a 3-year data collection on both drugs (Opiates and Cannabinoids) from the samples collected by Police and National Anti-Drug Agencies (AADK) for Hospital Tengku Ampuan Rahimah Klang, Selangor. Preference for Opiate drugs were 4 times higher than Cannabis as total positive Opiate samples were generally over 400 per month compared to over 100 in Cannabis. From Table 2 Opiate cases contributed to nearly (35% to 44%) of total samples collected every year from 2016 until 2018. There is a slight decreased trend throughout the years for Opiate positive cases as Cannabis cases maintained steadily at 11%.

Table 2: Percentage of total positive drugs over total collection

|       | OP   | THC  | OP   | THC  | OP   | THC  |
|-------|------|------|------|------|------|------|
| 2016  | 44.10| 11.20| 40.20| 13.40| 35.30| 11.00|
| 2017  | 45.80| 11.40| 40.10| 13.30| 34.90| 11.10|
| 2018  | 46.50| 11.50| 40.00| 13.20| 34.60| 11.20|

The trend of addiction for individual drugs differed where the month of January was projected highest for Opiates and in August, Cannabinoid users were most active (Table 1). HTAR received and analysed a total of 12988 samples for 3 years and reported the highest amount (1346) of positively combined Opiate (Morphine) and Cannabis in the month of August. School holidays and festive seasons may have been contributory to the increase in drug activities both in January and August.
Figure 3: Peak areas from monthly data (2016)

Figure 4: Peak areas from monthly data (2017)

Figure 5: Peak areas from monthly data (2018)
Analysis of Area

Significant areas were identified by investigating monthly topology in each year. Analysis using pivot methods by Microsoft Excel produced trending addiction patterns at Figures 3, 4 and 5. In 2016, opiate samples collected were highest from areas like Klang Utara (166), Kuala Langat recorded high in both years, (130) in 2017 and (214) in 2018. Cannabinoids were favourable for two consecutive years in Subang Jaya where in (2016 and 2017) maintained its numbers respectively, (54) in 2016 and (55) in (2017). However, the newest trend in Cannabinoid addiction were captured in Shah Alam, (60) in 2018.

Data across three years showed significant increasing numbers of Cannabis trend from Subang Jaya and Shah Alam. Samples from Kuala Langat for Opiates recorded an active upward trend recently. The National Anti-Drug agencies (AADK) became active in recent years with the numbers of Opiate addiction 122(2017), 144(2018) reported increasing in Selangor.

The peaks from Figures (3, 4, 5) were reanalyzed for the actual total number of positive drug for significant areas namely Kuala Langat, Klang Utara, Subang Jaya, Shah Alam, categorized into age groups and race.

Figure 6 summarizes the within race population of drug addicts (%) from 4 areas identified above in 3 years. Kuala Langat visualized a significant 0.158% / 0.160% within Malay / within Indian population in year 2018. There is emerging new trend in Shah Alam with rise in 0.054% (2016) and 0.179% (2018) within Indian communities.

![Figure 6: Drug addicts within race in Selangor from 2016-2018](image)

Table 3: Race Distribution (Klang, Subang Jaya, Kuala Langat, Shah Alam)

| Area                  | Total Population | Malay    | Chinese   | India    |
|-----------------------|------------------|----------|-----------|----------|
| Klang(Klang Kapar/Meru) | 744062           | 335439   | 190854    | 140519   |
| Subang Jaya           | 708296           | 264176   | 288752    | 80080    |
| Kuala Langat          | 220214           | 132053   | 38095     | 33165    |
| Shah Alam             | 541306           | 346411   | 83079     | 55867    |
Table 4: Data on age, gender and area

|          | Male  | Female | 0-14 Yrs | 15-64 Yrs | 65+ Yrs | Area    |
|----------|-------|--------|----------|-----------|---------|---------|
| Kuala    | 127.4 | 119.2  | 64T      | 167.4T    | 15.3T   | Selangor|
| Selangor | 63    | 60.8   | 28.5T    | 81.9T     | 13.5T   | Sabak B |
| Sabak B  | 140   | 125.4  | 76.3     | 173.3     | 15.8    | Klangat |
| Klang    | 543.3 | 465.3  | 243.6    | 714.2     | 50.9    | Klang   |
| Klangat  | 1097.1| 1025.1 | 497.5    | 1520.6    | 104     | Petaling|

In 2010, the department of statistics Malaysia published a booklet regarding populations in Malaysia. An excerpt on the identified areas were summarized in Tables 3 and 4. Population densities from Klang Utara, Subang Jaya, Kuala Langat and Shah Alam were searched with the assistance from the Department of Statistics, Malaysia.

From Appendix 1, Kuala Langat remained highest in Opiate density (285 subjects/0.16%, 2018) proportional to its population of 173.3 thousand when compared to Klang Utara (192 subjects/0.03%, 2018) with the population of 714.2 thousand (Table 4).

Data was collected according to Group 1 (61-70 years of age) Group 2 (51-60 years of age), Group 3 (41-50 years of age), Group 4 (31-40 years of age), Group 5 (21-30 years of age) with the inclusion of females and teenagers.

Opiate abusers from Kuala Langat and Klang Utara recorded high in these age groups in 3 years consecutively from figure 7 and 8. On the other hand, Cannabinoid addiction seemed to be the favour of groups 4 (31-40 years of age) and 5 (21-30 years of age) as seen in Subang Jaya and Shah Alam from Figures 9 and 10.

While persons from age groups 3 and 4 were more likely to indulge in opiates, notable peaks in the younger generation, group 5 (21-30s) were obvious in Shah Alam for Cannabinoid addiction (Appendix 1).

Figure 7: Opiate addiction vs Age groups (Kuala Langat)
Figure 8: Opiate addiction vs Age groups (Klang Utara)

Figure 9: Cannabinoid addiction vs Age groups (Subang Jaya)

Figure 10: Cannabinoid addiction vs Age groups (Shah Alam)
Drug addiction in Women and Teenagers

The drug menace is uglier when women and children were involved. Some data on women and teenagers were detected in this study. Although the numbers are few, they are a silent warning to dangers ahead when women have important roles in child bearing, upbringing and leadership in families.

In 2016, from (30) female drug addicts, 6 were detained in Sabak Bernam. However (4) teenagers aged 16 were found to have used Cannabinoids. In 2017, (20) women were involved and the trend lowered in 2018 with only (12). The drug addiction prevalence is higher in men. The numbers in teenagers are slowly rising with (4) 2016, (7) 2017 and (11) 2018, in activities abusing Cannabinoids.

Discussion

The study concentrates on subjects contributory to the drugs menace in the state of Selangor. Deliberation on parameters like Area prone to drug addiction, popular age-groups and race can help authorities in their control through regulations.

As the endemic of drug addiction is ever increasing, continuous efforts to educate, rehabilitate and control is a concern. Malaysian young adults were the targeted groups. Identified from their ages being in the range of group 3 (41-50s), group 4 (31-40s) and group 5 (21-30s), these timelines are prime years of productive life. Failure to overcome stressful living circumstances can result in wasted educational resources and opportunities.

The remote geographical areas in Selangor like Kuala Langat could have been recreational for Opiate abuse but it is difficult to decipher reasons of popularized Cannabinoid abuse in Shah Alam and Subang Jaya. Psychological errors due to social pressures in smoking, vaping were often traps of modernization especially in the cities.

The study has achieved is goal in combing areas under the view of Hospital Tengku Ampuan Rahimah Klang for drug abuse in Selangor. Systematic reviews on drug detection are limited despite the large source of data available. This study was aimed for statistical practice, to obtain an overview of drug addiction contours in the state of Selangor. The capture of samples from National Anti-Narcotics and its agencies are landscapes of efficiency when combating the drug menace. By combing the contours in Selangor prone to drugs activities, data provided can inform, alert authorized planning for rehabilitation, promote drug- education and regulate anti-drug activities by law enforcement.

Acknowledgements

We would like to thank the Director General of Health Malaysia for his permission to publish this article. Ethical approval for this study was obtained from the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia. In my knowledge, this study has no conflict of interest.

Special thanks to Anti Narcotics Selangor (Police/National agency anti dadah- AADK) for collection of samples for analysis by the Drug Laboratory, the (Head of Department of Pathology, Dr Meor Zamari Meor Kamal), (Head of Unit Chemical Pathology, Dr Hanisah Abdul Hamid) for their kind support and encouragement throughout the whole study. Special thanks to The Department of Statistics Malaysia (Pn Aini Faezan and Pn Noor Hayati Dahari) for guidance in maneuvering their statistical publications. This article would not be what it is without help from Dr Sharmini Selvarajah of SS Consulting and Dr Nadiah Saat from Clinical Research Centre (CRC) Hospital Kuala Lumpur, for the best visualization of data in statistics.
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