Disability-Adjusted Life Years among Drug Users in Khon Kaen: An Evidence-Based Approach

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Objective: *To examine the Disability Adjusted Life Years (DALYs) among drug users in Khon Kaen.*
Material and Method: *A cross-sectional descriptive study was conducted between January 2014 and February 2015. Patients' medical records, supported by the Khon Kaen Provincial Public Health Office, were used for data regarding the treatment of the drug users between October 2013 and September 2014. SPSS version 19.0 for windows was used to analyze descriptive statistics and Pearson's correlations.*
Results: *A review of medical records revealed a total number of drug users were 3,605 males (92.25%) and 303 females (7.75%). A total of 2,195 cases (56.17%) were drug dependence. 20 drug users died due to drug-related causes. A total DALYs were 6,772.26 and a prevalence rate of DALYs was 3.76/1,000 populations. The correlation analyses showed significantly factors related to the DALYs among drug users were age, occupation, pattern of drug use, levels of severity, drug- related death and treatment services.*
Conclusion: *The DALYs were apparently high among male drug users, who completed primary school education, were drug-dependent and being treated in group therapy. The health authorities may use these associated factors in order to develop or improve programs related to prevention, harm reduction and treatment services effectively.*

Keywords: *DALYs, Drug users*

J Med Assoc Thai 2015; 98 (Suppl. 6): S56-S63
Full text. e-Journal: *http://www.jmatonline.com*

Illicit drug use is a major concern in Thailand and worldwide. It is estimated that a total number of 243 million people (5.2% of the global population) would have used illicit medications, death due to drug related causes were 183,000 cases and a prevalence rate of DALYs 40.0 per million population in 2012[1]. The numbers of drug abusers among Thais have increased from 367,504 in 2011 to 378,817 in 2012. Khon Kaen Province is one of the top ten places in the country for illicit drug users, where it was found that the treatment increased in 2012 with 6,498 people on treatment to 7,333 cases in 2014[2].

The impact of drug uses included drug-related death resulting from drug-overdoses, drug poisoning or suicides. Other impacts were short and long term, in addition to associated diseases from drug-injection such as HIV, hepatitis B, hepatitis C, drug use-related diseases[3,4].

The Disability Adjusted Life Years (DALYs) are a combined measurement using both death and disability rates to provide information for health planners in order to allocate the health resources effectively to the health sectors and reflect the policy programs about the effectiveness of the prevention and treatment services[5]. The DALYs values are varied based on severity of the diseases, disability or death. There are many variables affect the DALYs values - e.g. duration of disability, age of death, characters of patients, prevention programs and treatment services[6,7,9].

The recent Global Buren of Disease (GBD) reported in 2010 that the DALYs in population were 2 DALYs per 1,000 populations and the number was different in each country[4]. There was a report of Comparative Risk Assessment of drug abuse in Thailand, which estimated the DALYs for heroin, opioid and amphetamine abuse in 2009 were 41,100 in males and 4,030 in females and in the year 2011 were 6,012 in males and 523 in females[7,8].

There are studies that examined the DALYs for drug abuse[6-8]. The majority of these studies calculated the DALYs using the estimation method based on mobility and mortality rates and the duration

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and severity of disability. The general problems of the estimation method were restrictions in the accuracy in the self-report and the inaccuracy of the initial agreement[5]. In order to identify drug-use problems clearly in the local level, the authors examined the DALYs among drug users in Khon Kaen Province using evidence-based approach.

Material and Method

A cross-sectional descriptive study was conducted between January 2014 and February 2015.

Data sources

The Khon Kaen Provincial Public Health Office supported the dataset of medical records regarding the treatment and rehabilitation for drugs abuse. The dataset between October 2013 and September 2014 was used. 7,333 records were registered. The present study was approved by the ethics committee, Khon Kaen University: reference No. HE571334.

Definition

1) Disability-Adjusted Life Years (DALYs) are indicators which tells of the loss of time due to illness or disability (Years of Life Lost due to Disability: YLDs) and time consumed by premature deaths (Years of Life Lost: YLLs)[5].

1.1) Years of Life Lost due to Disability (YLDs)

$$YLL = \frac{KCe^{ra}}{(r+\beta)^2}\left[e^{-(r+\beta)(L+a)}[-(r+\beta)(L+a)-1]-e^{-(r+\beta)a}[-(r+\beta)a-1]\right]+\frac{1-k}{r}(1-e^{-rL})^{[5]}$$

For standard YLLs used in the GBD study: K = 1, C = 0.1658, r = 0.03, and β = 0.04 9[5].

K = age-weighting modulation factor

C = a necessary adjustment constant due to unequal age weights

r = discount rate

a = age at death

β = age-weighting parameter

L = the standard expectation of life at age a

1.2) Years of Life Lost (YLLs)

$$YLD = D\left\{\frac{KCe^{ra}}{(r+\beta)^2}\left[e^{-(r+\beta)(L+a)}[-(r+\beta)(L+a)-1]-e^{-(r+\beta)a}[-(r+\beta)a-1]\right]+\frac{1-K}{r}(1-e-rL)\right\}^{[5]}$$

D = disability weight

K = age-weighting modulation factor

C = a necessary adjustment constant due to unequal age weights

r = discount rate

a = age of onset of the disability

β = age-weighting parameter

L = duration of disability

2) Drug use = illicit drug use which is defined as including a use of a variety of drugs. In the present study consists of amphetamine-type stimulants, cannabis, heroin and other opioids and inhalants[4].

3) Drug-related death = death as referred to ICD-10 where the drugs involved in overdose, suicide, trauma, homicide, motor vehicle accidents, infectious diseases (HIV), injuries and other forms of accidental death[9].

4) Severity = drug use, drug dependence as classified by ICD-10[9]. In the present study, a drug-harmful user is a drug user who continued using drug(s) for a period of longer than 3 years or having evidence of persistent or recurrent psychological or physical problems either caused or exacerbated by its use or having treatment(s) more than 3 times in 1 year[8].

5) Hospitals in this present study are all organizations, which provide services for treatment and rehabilitation for drug dependent in Khon Kaen province.

Inclusion criteria

Drug users who domiciled in the Khon Kaen province by birth, work or study in the province for at least 6 months.

Exclusion criteria

1) Incomplete data records.

2) The cause of death was not related to the use of drugs.

Calculating

1) The DALYs are calculated based on the model of natural health of drug use as shown in Fig. 1.

2) The significant parameters were based on the Global Burden of Disease Study 2010[4].

3) The disability weigh (DW) was based on the Global Burden of Disease Study 2010. In the present study, consists of Cannabis dependence = 0.329, Met amphetamine dependence = 0.353, Heroin and other opioid dependence = 0.641 and other substance DW like Cannabis dependence[6].

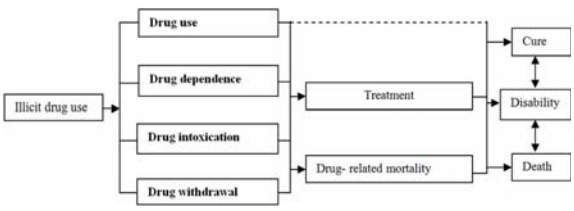

Fig. 1 A basic natural history model of illicit drug use.

4) The calculation was performed based on the individual feasibility of stage of health.

Level of severity	Stage of health	Calculation
1) Drug use	Treatment	NO
2) Drug dependence +	Treatment→Cure	YLD
3) Drug dependence +	Treatment→Disability	YLD
4) Drug dependence +	Treatment→Disability →Death	YLD, YLL
5) Drug dependence +	Death	YLL

Statistical analysis

SPSS version 19.0 for windows was used to analyze descriptive statistics and Pearson's correlations. A statistical significance was defined as *p*-value less than 0.05.

Results

Based on the inclusion and exclusion criteria, 3,908 cases were selected.

Drug abusers were predominantly males, aged 20-29 years, completed secondary school 9 years), unemployed, and drug-dependent as shown in Table 1.

The present study showed that drug users, categorized by levels of severity, were predominantly drug dependence, which accounted for 2,195 cases (56.17%). A pattern of drug use included single drug use, accounting for 3,666 cases (93.81%) and poly drug use for 242 cases (6.19%) as shown in Table 1. A total death due to drug-related causes were 20 cases including motor vehicle accidents for 5 cases, infectious diseases (HIV) for 5 cases, injuries and other forms of accidental death were 9 cases and suicide for 1 case as shown in Table 2.

A total DALYs were 6,772.26, a prevalence rate of DALYs 3.76/1,000 populations including years lost due to disability (YLDs) were 5,800.92 and years of life lost (YLLs) were 971.34.

Table 1. Basic information of drug abuse who registered at hospitals, Khon Kaen, Thailand in 2014

Variables	Total		Drug abuse		Drug dependence		Drug harmful use	
	n	%	n	%	n	%	n	%
Gender								
Males	3,605	92.25	1,520	38.89	2,009	51.41	76	1.94
Females	303	7.75	110	2.81	186	4.76	7	0.18
Total	3,908	100.00	1,630	41.71	2,195	56.17	83	2.12
Age								
<20	1,204	30.81	653	16.71	540	13.82	11	0.28
20-29	1,724	44.11	657	16.81	1,022	26.15	45	1.15
30-39	743	19.01	255	6.53	465	11.90	23	0.59
>39	237	6.06	65	1.66	168	4.30	4	0.10
Total	3,908	100.00	3,260	41.71	4,390	56.17	166	2.12
Levels of education								
No qualification	30	0.77	15	0.38	15	0.38	0	0
Primary (6 years)	1,291	33.03	542	13.87	727	18.60	22	0.56
Secondary (9 years)	1,552	39.71	660	16.89	862	22.06	30	0.77
Higher secondary (12 years)	745	19.06	296	7.57	429	10.98	20	0.51
Higher diploma (14 years)	215	5.50	85	2.18	122	3.12	8	0.20
University	75	1.92	32	0.82	40	1.02	3	0.08
Total	3,908	100.00	1,630	41.71	2,195	56.17	83	2.12
Occupation								
Unemployed	1,703	43.58	870	22.26	785	20.09	48	1.23
Laborer	1,606	41.10	525	13.43	1,062	27.18	19	0.49
Employee in factory	49	1.25	21	0.54	28	0.72	0	0
Government officer	84	2.15	38	0.97	39	1.00	7	0.18
Agriculturist	283	7.24	97	2.48	181	4.63	5	0.13
Retailer	183	4.68	79	2.02	100	2.56	4	0.10
Total	3,908	100.00	1,630	41.71	2,195	56.17	83	2.12

The DALYs were categorized by gender, age, educational level, occupation, levels of severity and treatment services. The present study found the DALYs were highest in males (6,237.65 (92.11%)), age group of 20-29 years (2,758.92 (40.74%)), primary school level (2,509.33 (37.05%)), laborers (3,352.31 (49.50%)), drug-dependent (6,335.37 (93.55%)) and in compulsory treatment services (3,966.03 (58.56%)) as shown in Tables 3 and 4.

The present study revealed that the highest YLD were found in male (5,433.34 (80.23%)), age group of 30-39 years (2,177.65 (32.16%)), those who completed primary school education (2172.64 (32.08%)), laborers (2,917.53 (43.08%)), drug-dependent (5,514.54 (81.43%)) and those who received compulsory treatment services (3,289.51 (48.57%)).

Authors study's results also showed that the highest YLL were found in males (804.31 (11.88%)), age group of 20-29 years (608.46 (8.98%)), those who completed primary school education (336.69 (4.97%)), those who were unemployed (336.69 (4.97%)), drug-dependent (820.83 (12.12%)) and those who received compulsory treatment services (676.52 (9.99%)) as shown in Table 4.

The correlation analyses showed that the significant factors related to the DALYs among drug users were age, occupation, pattern of drug use, levels of severity, drug-related death and treatment services as shown in Table 5.

Discussion

The DALYs are indicators to reporting loss of time due to illness or disability and time consumed by premature deaths. The present study found that the proportions of the DALYs of drug users were higher in males more than females. This is consistent to other studies[10-12].

The present study showed that the DALYs among drug users in Khon Kaen were 6,772.26, a prevalence of 3.76 DALYs per 1,000 population, comparing with the GBD's report in 2010 which found a prevalence rate of 2 DALYs per 1,000 population and 4 DALYs per 1,000 population in the countries located east of the Mediterranean[6]. Although the present study DALYs were predominate the GBD's report in 2010, they were similar to the results from the countries located east of the Mediterranean. The DALYs among drug users in Khon Kaen were predominate the GBD's report in 2010 may be because calculation for the DALYs used the estimation method which were based on mobility and mortality rates in addition to lack of some significant data in some country[6]. These may affect to DALYs and resulting in lower results than this present study.

The recent Comparative Risk Assessment of drug use in Thailand in 2011 found the DALYs were 6,012 in males and 523 in females[8]. The present study showed that the DALYs in males were 6,237.65 and 34.61 in females, which were higher than the results

Table 2. Drug-related death causes by gender and age group, Khon Kaen, Thailand in 2014

Drug- related death	Gender (n)		Age (years) (n)	
	Male	Female	<20	20-29
Motor vehicle accidents	4	1	3	2
Infectious diseases-HIV	5	0	0	5
Injuries and other forms of accidental death	7	2	5	4
Suicide	1	0	0	1
Total	17	3	8	12

Table 3. The DALYs, YLDs and YLLs of drug users who registered at hospitals, Khon Kaen, Thailand in 2014

Health outcomes	Total	Mean	SD	Median	Range	Prevalence per 1,000 population
DALYs	6,772.26	-	-	0.63	61.86 (0-61.86)	3.76
YLDs	5,800.92	1.48	2.17	-	-	3.22
YLLs	971.34	-	-	47.07	19.38 (42.48-61.86)	0.54

Table 4. The DALYs, YLDs and YLLs of drug users who registered at hospitals by gender, age, levels of education, occupation, severity and treatment services, Khon Kaen, Thailand in 2014

Variables	DALYs	%	YLDs	%	YLLs	%
Gender						
Male	6,237.65	92.11	5,433.34	80.23	804.31	11.88
Female	534.61	7.89	367.58	5.43	167.03	2.47
Total	6,772.26	100.00	5,800.92	85.66	971.34	14.34
Age						
<20	799.78	11.81	436.90	6.45	362.88	5.36
20-29	2,758.92	40.74	2,150.46	31.75	608.46	8.98
30-39	2,177.65	32.16	2,177.65	32.16	0	0
>39	1,035.92	15.30	1,035.92	15.30	0	0
Total	6,772.27	100.00	5,800.93	85.66	971.34	14.34
Levels of Education						
No qualification	145.04	2.14	83.18	1.23	61.86	0.91
Primary (6 years)	2,509.33	37.05	2,172.64	32.08	336.69	4.97
Secondary (9 years)	2,192.31	32.37	1,811.09	26.74	381.22	5.63
Higher secondary (12 years)	1,383.34	20.43	1,191.77	17.60	191.57	2.83
Higher diploma (14 years)	370.89	5.48	370.89	5.48	0.00	0.00
University	171.35	2.53	171.35	2.53	0.00	0.00
Total	6,772.26	100.00	5,800.92	85.66	971.34	14.34
Occupation						
Unemployed	1,988.23	29.36	1,543.71	22.79	444.52	6.56
Labor	3,352.31	49.50	2,917.53	43.08	434.78	6.42
Factory worker	72.10	1.06	72.10	1.06	0	0
Government officer	129.05	1.91	129.05	1.91	0	0
Agriculturist	846.15	12.49	754.11	11.14	92.04	1.36
Retailer	384.43	5.68	384.43	5.68	0	0
Total	6,772.26	100.00	5,800.92	85.66	971.34	14.34
Levels of severity						
Drug abuse	150.51	2.22	0	0	150.51	2.22
Drug dependence	6,335.37	93.55	5,514.54	81.43	820.83	12.12
Drug harmful use	286.39	4.23	286.39	4.23	0	0
Total	6,772.26	100.00	5,800.92	85.66	971.34	14.34
Treatment and rehabilitation services						
Behavioral modification drug camp	125.52	1.85	25.18	0.37	100.34	1.48
Outpatient department	1,339.78	19.78	1,291.66	19.07	48.12	0.71
Inpatient department	1,329.13	19.63	1,182.77	17.46	146.36	2.16
Group therapy by treatment control	3,966.03	58.56	3,289.51	48.57	676.52	9.99
Correctional	11.81	0.17	11.81	0.17	0	0
Total	6,772.26	100.00	5,800.92	85.66	971.34	14.34

from the Comparative Risk Assessment of drug use. The possible explanation was the Comparative Risk Assessment of drug use calculated the DALYs using the estimation method which were based on mobility and mortality rates, particularly in heroin, opioid and Methamphetamine users but limited data of other illicit drugs[8]. However, this present study calculated the DALYs using evidence-based approach with individual data and the population study of drug users were smaller-with strong inclusion criteria for calculation, the DALYs value therefore were higher.

The correlation analyses showed significantly factors related to the DALYs among drug users were age, occupation, pattern of drug use, levels of severity, drug-related death and treatment services.

The age group of 20-29 years was found of having the higher DALYs than other age groups. This may explain by the level of dependence and harmful use of 27.30% in this age group. In addition, this age group was usually drinking[12], in road accidents[13].

Table 5. Correlations between DALYs and demographic data, pattern of drug use, treatment services and drug-related death, Khon Kaen, Thailand in 2014

Variables	Correlation	*p*-value
Gender	0.002	0.888
Age	0.252	<0.001
Education	0.016	0.317
Occupation	0.092	<0.001
First age of drug use	0.006	0.716
Pattern of drug use	0.037	<0.021
Levels of severity	0.337	<0.001
Treatment service	0.237	<0.001
Drug-related death	0.839	<0.001

The present study found that this age group died due to drug-related causes such as motor vehicle accidents for 2 cases, injuries and other forms of accidental death for 6 cases which affected the DALYs.

Laborers had higher DALYs than other groups. This may be because the nature of work requires a lot of energy and night work that may lead to drug users. Drug users generally have used drugs during or after work or while driving[23]. These lead to illnesses and death due to drug-related diseases that resulted in higher DALYs. The other groups who were unemployed having the second highest DALYs. This group had lower income, which may affect their physical and mental health and lead to drug abuse[15,16].

The poly-drug use resulted in acute detoxification, complexity in health problems, and death due to drug-related cause. This present study found drug users were poly-drug use of 242 cases and they were harmful use of poly-drug use for 53 cases (63.85%), which were affected levels of severity and eventually high DALYs.

The drug-dependent group had high DALYs because the use of drugs in drug dependence are more severe and will have a direct effect on the brain, changing the normal person to have cravings and to want to use or seek drugs. The drugs affect both physical and mental health, having illness, other co-morbidity and deaths related to drug use this will affect more deaths and as a result having the higher DALYs[20-22].

In this study, the drug users were found dead in 20 cases. Death in the age group below 20 years and the age group of 20-29 years were 8 and 12 cases, respectively. The YLLs invert to age, i.e. younger age resulted in higher YLLs as seen in the present study, in which the YLLs were 971.34 (14.34%).

The DALYs of drug users who received treatment services with group therapy by treatment control were high because this method was treated under the concept of "the drug users are not criminals"[19]. Drug use associated with crime resulted from economic, social, educational problems leading to many drug users walking in to be treated by this method[15,16]. However, with this low effective treatment method, this resulted in a high treatment read mission rate and affected the YLDs[17]. In addition, this group of drug abusers practiced intravenous drug abuse which was a risk factor of drug-related death[14,18], affecting the YLLs. The present study showed that the DALYs of drug abusers who were treated by this method were more than half of the overall DALYs.

The present has many strengths including internal consistency. The authors tested the internal consistency of available data sources from hospitals and second tested the accuracy of the causes of drug-related death. Limitations of the present included the dataset were hospital-based which may not cover the drug abuser who did not register in this database.

Conclusion

The DALYs were high in the group of males, completed primary school education, labor worker, drug dependence and having group therapy by treatment control. The health authorities may use these associated factors in order to develop or improve an effective program related to prevention, harm reduction and treatment services.

What is already known on this topic?

There are many studies using the DALYs to measure health outcomes. The was a report of comparative risk assessment of drug abuse in Thailand for heroin, opioid and amphetamine abuse, in 2009 and 2011. The general problems of using estimation method were limitations in validity, particularly in self-reported health data and non-valid assumption.

What this study adds?

A review of medical records revealed a total number of drug users were 3,605 males (92.25%) and 303 females (7.75%). A total of 2,195 cases (56.17%) were drug dependent. Twenty drug users died due to drug-related causes. A total DALYs were 6,772.26 and a prevalence rate of DALYs was 3.76/1,000 populations. The correlation analyses showed significantly factors related to the DALYs among drug users were age,

occupation, pattern of drug use, levels of severity, drug-related death and treatment services. The DALYs were apparently high among male drug users, with completed primary school education, drug dependence and being treated with treatment control. The health authorities may use these associated factors in order to develop or improve program related to prevention, harm reduction and treatment services effectively.

Acknowledgement

The authors thank the Khon Kaen Provincial Public Health Office who supported the data from medical records regarding the treatment and rehabilitation services.

Potential conflicts of interest

None.

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ปีสุขภาวะที่สูญเสียไปของผู้ใช้ยาเสพติด จังหวัดขอนแก่น

จักรสันต์ เลยหยุด, วริสรา ลุวีระ, มานพ คณะโต

วัตถุประสงค์: *เพื่อศึกษาปีสุขภาวะสูญเสียไป (Disability Adjusted Life Years: DALYs) จากการใช้ยาเสพติดในจังหวัดขอนแก่น*

วัสดุและวิธีการ: *การศึกษาครั้งนี้เป็นการศึกษาเชิงพรรณนาแบบภาคตัดขวางทำการศึกษาระหว่างเดือนกุมภาพันธ์ พ.ศ. 2556 ถึง กุมภาพันธ์ พ.ศ. 2557 โดยใช้ข้อมูลผู้ใช้ยาเสพติดที่เข้ารับการบำบัดรักษาระหว่าง ตุลาคม พ.ศ. 2556 ถึง กันยายน พ.ศ. 2557 จากสำนักงานสาธารณสุขจังหวัดขอนแก่น ใช้โปรแกรม SPSS version 19.0 พรรณนาข้อมูลด้วยสถิติพรรณนาและวิเคราะห์ความสัมพันธ์ด้วย Pearson's correlations*

ผลการศึกษา: *จากการศึกษาข้อมูลบันทึกการรักษาผู้ป่วยที่ใช้ยาเสพติดพบเพศชาย 3,605 ราย ร้อยละ 92.25 เพศหญิง 303 ราย ร้อยละ 7.75 เป็นผู้ติดยาเสพติด (Dependence) 2,195 ราย ร้อยละ 56.17 มีผู้เสียชีวิตจากสาเหตุที่สัมพันธ์กับการใช้ยาเสพติด 20 รายโดยรวมปีสุขภาวะที่สูญเสียไป 6,772.26 อัตราป่วย 3.76 DALYs/ประชากรพันคน พบตัวแปรที่มีความสัมพันธ์กับ DALYs อย่างมีนัยสำคัญ ประกอบด้วย อายุ อาชีพ รูปแบบการใช้ยาเสพติด ระดับความรุนแรงการเสพติด การเสียชีวิตด้วยโรคที่สัมพันธ์กับการใช้ยาเสพติด และวิธีการบำบัดรักษา*

สรุป: *ปีสุขภาวะที่สูญเสียไปของผู้ใช้ยาเสพติดพบว่ามีค่าสูงในเพศชาย การศึกษาระดับชั้นประถมมีการป่วยระดับติดยาเสพติดเข้ารับการรักษาด้วยวิธีกลุ่มควบคุมบำบัด จึงควรพัฒนาหรือปรับปรุงวิธีการในการป้องกันการลดความรุนแรงจากการใช้ยาเสพติดและวิธีการบำบัดรักษาให้มีประสิทธิผลมากขึ้น*