Committed Suicide: Forensic Autopsy Analysis at Ramathibodi Hospital during Year 2001-2010

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Background: *Suicide is one of the most important causes of death in the world. To study the behaviors and risk factors may be helpful to prevent suicide.*
Objective: *To retrospectively study the factors that affected suicide in forensic postmortem cases at Ramathibodi Hospital, Bangkok, Thailand between 2001 and 2010.*
Material and Method: *Two hundred ninety suicidal cases from 7,102 forensic postmortem autopsies in Ramathibodi Hospital between 2001 and 2010 were descriptively retrospective studied. Study topics included sex, age, nationality, year, methods of suicide, and HIV.*
Results: *The suicide-rate in the present study varied between 2.53% and 6.91% (average 4.08%) of the forensic autopsy cases. The peak was found in 2003. Males had higher suicide rate than females [ratio of M:F of 4.3:1 (235 males and 55 females)]. The age varied from seven years to 91 years. Although the average age of suicide was 37.38 years, the peak was found in the young adult (age group of 21 to 30 years). Male, younger age, and foreigner were related to suicide with statistical significance. Hanging was the most frequent method of suicide followed by fall from height (62.1% and 17.2% respectively) and by firearm (in male) and toxic substance ingestion (in females). Of all the suicide, 5.1% were HIV seropositive, which is slightly more than non-HIV cases (4.0%) but this was not statistically significant.*
Conclusion: *The suicidal cases among unusual death were related to varieties of factors. Male, younger age, and foreigner were significant related to suicide. Hanging and falling from height were the most frequent method of suicide.*

Keywords: *Suicide, Forensic autopsy, Method of suicide, Suicide risk, Suicide in Thailand*

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Suicide is the major manner of unusual death worldwide[1]. Worldwide, over a million people die from suicide each year[2]. The overall world suicide-rate is approximately 16 cases per 100,000 people per year[3,4]. During the past 45 years, the worldwide suicide rate had increased by 60%[5]. In 2002, Thailand was ranked 59 of world suicide-rate with an average of 7.8 per 100,000 people[6]. The variation of suicide-rate in Thailand between 2000 and 2011 was found to be between 5.77 and 8.55 per 100,000 people[7]. Knowing the incidence and related factors of suicide may prevent or decrease the number of suicides. The suicide cases reported to Ramathibodi Hospital, located in central of Bangkok, Thailand were analyzed in present study to search for informative data.

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Material and Method

Seven thousand one hundred and two forensic postmortem inquest by the criminal procedure code from Central Area of Bangkok Metropolitan of Thailand that were autopsied at the Division of Forensic Medicine, Department of Pathology, Faculty of Medicine, Ramathibodi Hospital, Mahidol University between 2001 and 2010 were studied. Two hundred and ninety suicidal cases were analyzed. All cases were tested for anti-HIV by chemiluminescence immunoassay (CLIA). All data were gathered and analyzed for the incidence of suicide in different genders and age groups. Various factors that may affect the incidence of suicide, i.e., sex, age, methods of suicide and HIV infection were also tested for the association. The Chi-square test and Fisher's exact test were used for testing association between sex, age, nationality, HIV, and suicide. We use the Wilcoxon rank-sum test (Mann-Whitney U test) for the age comparison because its distribution was not normal.

A *p*-value less than 0.05 was statistically significant. These analyses were carried out using Stata software (version 11.2; StataCorp).

The present study has been approved by the Ethical Committee on Human Rights Related to Research Involving Human Subjects, Faculty of Medicine, Ramathibodi Hospital, Mahidol University (MURA2011/443).

Results

The number of suicide between 2001 and 2010 ranged from 17 to 49 cases per year (total 290 cases), whereas the forensic autopsy cases ranged from 600 to 817 cases per year (total 7,102 cases). Thus, the suicide rate varied from 2.53% to 6.91% (average 4.08%). The peak was found in 2003. Two hundred thirty five males and 55 females committed suicide. Males had much more suicide than females, every years. Ratio of suicide rate of males to females was 4.3:1. The number of suicidal case for each year is showed in Table 1.

From 7,102 cases autopsied because of unnatural death, there were 235 suicidal cases from 5,121 male and 55 suicidal cases from 1,926 female (4.6% and 2.8% respectively). The relationship between sex and suicide was found. Male were statistically significant (p = 0.001) more likely to suicide than female. The average age of the suicidal cases was 37.38 years and the median was 33 years. For those who did not commit suicide, the average age was 49.32 years and the median was 47 years. The age of the suicide and non-suicide cases was not in normal distribution so the Wilcoxon rank-sum (Mann-Whitney) test was done to compare the median age of the two groups. The difference of age of the suicide and non-suicide cases was found with statistical significance (p<0.001). The suicide cases had younger age than non-suicide cases.

For the nationality, from 6,818 autopsy cases of Thai national, 261 cases committed suicide (3.8%). For the foreigners, from 284 cases, 29 committed suicide (10.2%). A relationship between nationality and suicide was found (p<0.001). Therefore, foreigners were more prone to suicide than Thai people in Thailand. The HIV test was done for all of suicide cases and for almost all cases of non-suicide. There were 17 suicide cases out of 331 HIV-positive cases, and 273 suicide cases out of 6,771 HIV-negative cases (5.1% and 4.0% respectively). The incidence of HIV-positive in suicide cases was slightly higher

Table 1. Suicide rate of forensic postmortem examination at Ramathibodi Hospital during year 2001-2010

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Male	14	22	42	32	18	20	14	33	21	19	235
Female	3	4	7	10	4	2	5	5	11	4	55
Number of suicide	17	26	49	42	22	22	19	38	32	23	290
Number of autopsy	600	615	709	765	718	710	752	712	704	817	7,102
Percent of suicide	2.83	4.23	6.91	5.49	3.06	3.10	2.53	5.34	4.55	2.82	4.08

Table 2. Demographic factors of suicide cases and non-suicide cases

Factors	Total (%)	Suicide (%)	Non-suicide (%)	*p*-value
Sex				
Male	5,121 (72.1)	235 (4.6)	4,886 (95.4)	0.001*
Female	1,981 (27.9)	55 (2.8)	1,926 (97.2)	
Age				
Mean (SD)		37.38 (14.43)	49.32 (22.66)	<0.001*
Median (range)		33 (7-91)	47 (0-113)	
Nationality				
Thai	6,818 (96.0)	261 (3.8)	6,557 (96.2)	<0.001*
Foreigner	284 (4.0)	29 (10.2)	255 (89.8)	
HIV				
Positive	331 (4.7)	17 (5.1)	314 (94.9)	0.322
Negative	6,771 (95.3)	273 (4.0)	6,498 (96.0)	
Total	7,102 (100)	290	6,812	

than non-HIV but the statistical analysis showed no significant difference.

The distribution of age of suicidal cases in each year is showed in Table 3. The youngest suicidal case was seven years old and the oldest was 91 years old (average 37.38). Although the average age of suicide was 37.38 years, the peak was found in the age group of 21 to 30 years in both males and females (31.5% in male and 41.8% in female) followed by the 31 to 40 age group (23.4% in male and 16.4% in female). The male to female ratio showed that in the age above 30 years, male had a much higher suicide rate than female. (Age group 30 to 40 years, 40 to 50 years, and above 60 years M:F ratio were 6.1:1, 7.2:1, and 11.0:1 respectively). The average M:F ratio was 4.3:1 (Table 3).

Hanging was the most common method of suicide in both male and female and almost every age group, as shown in Table 5. There were 180 cases of hanging out of 290 suicidal cases, which accounted to 62.1%. The second most common method of suicide was falling from height, which accounted to 17.2% (50 fall from height out of 290 suicides). Subsequently, suicide by firearm injury, toxic substance ingestion, and drowning were noted with 7.9%, 6.2%, and 4.8% respectively. There were a few cases of suicide by carbon monoxide poisoning, blast injury, cut wound at the wrist, and stab wound. The ratio of male to female in firearm injury was as much as 10.5:1. This was followed by hanging, M:F ratio 5.4:1. However, the odd ratio of male to female for the method of suicide revealed that male chose the fire arm and hanging more than female (M:F odds ratio (95% CI) were 2.60 (0.60-23.51) and 1.77 (0.93-3.33) respectively) and female chose the toxic substance ingestion, drowning, and fall from height more than male (M:F odds ratio (95% CI) were 0.34 (0.11-1.08), 0.57 (0.16-2.58) and 0.53 (0.25-1.17) respectively). The carbon monoxide poisoning, blast injury, cut wound at the wrist, and stab wound were found in a few cases and only in male.

The age of male and female suicidal cases were compared. It was found that most cases of suicidal male's age were above 30 years (59.6%). In contrast, most case of female committed suicide before 30 years old (52.7%). The relation of sex and age of suicidal cases were found statistical significant ($p = 0.033$). In

Table 3. The distribution of age in male and female suicidal cases

Age groups	Total (%)	Male (%)	Female (%)	M:F ratio
Less than 20	24 (8.3)	18 (7.7)	6 (10.9)	3.0:1
20-30	97 (33.4)	74 (31.5)	23 (41.8)	3.2:1
30-40	64 (22.1)	55 (23.4)	9 (16.4)	6.1:1
40-50	49 (16.9)	43 (18.3)	6 (10.9)	7.2:1
50-60	27 (9.3)	20 (8.5)	7 (12.7)	2.9:1
More than 60	24 (8.3)	22 (9.4)	2 (3.6)	11.0:1
Unknown	5 (1.7)	3 (1.3)	2 (3.6)	1.5:1
Total	290 (100)	235 (100)	55 (100)	4.3:1

Table 4. The distribution of method of suicide in male and female

Methods	Total (%)	Male (%)	Female (%)	M:F	M:F OR (95% CI)
Hanging	180 (62.1)	152 (64.7)	28 (50.9)	5.4:1	1.77 (0.93-3.33)
Fall from height	50 (17.2)	36 (15.3)	14 (25.5)	2.6:1	0.53 (0.25-1.17)
Firearm injuries	23 (7.9)	21 (8.9)	2 (3.6)	10.5:1	2.60 (0.60-23.51)
Toxic substance ingestion	18 (6.2)	11 (4.7)	7 (12.7)	1.6:1	0.34 (0.11-1.08)
Drowning	14 (4.8)	10 (4.3)	4 (7.3)	2.5:1	0.57 (0.16-2.58)
Carbon monoxide poisoning	2 (0.7)	2 (0.9)	0 (0.0)	-	-
Blast injury	1 (0.3)	1 (0.4)	0 (0.0)	-	-
Cut wound at wrist	1 (0.3)	1 (0.4)	0 (0.0)	-	-
Stab wound	1 (0.3)	1 (0.4)	0 (0.0)	-	-
Total	290 (100)	235 (100)	55 (100)		

Table 5. Comparing of age groups and methods of suicide of male and female suicidal cases

	Total (%)	Male (%)	Female (%)	*p*-value
Age				
Less than 30	121 (41.7)	92 (39.1)	29 (52.7)	0.033*
More than 30	164 (56.6)	140 (59.6)	24 (43.6)	
Method				
Hanging	180 (62.1)	152 (64.7)	28 (50.9)	0.042*
Non-hanging	110 (37.9)	83 (35.3)	27 (49.1)	
Toxicant ingestion	18 (6.2)	11 (4.7)	7 (12.7)	0.035*
Non-ingestion	272 (93.8)	224 (95.3)	48 (87.3)	
Firearm	23 (7.9)	21 (8.9)	2 (3.6)	0.059
Non-Firearm	267 (92.1)	214 (91.1)	53 (96.4)	
Fall from height	50 (17.2)	36 (15.3)	14 (25.5)	0.150
Non-Fall	240 (82.8)	199 (84.7)	41 (74.5)	
Total	290 (100)	235 (100)	55 (100)	

addition, the relation of sex and some methods of suicide were also found. The male suicide cases correlated with hanging (p = 0.042) and the female suicide cases correlated with toxic substance ingestion (p = 0.035). The other methods of suicide were not found correlated.

Discussion

Suicide is the worldwide leading cause of unusual deaths. In the past 45 years, the suicide-rates have increased by 60%[3,4]. The World Health Organization (WHO) assesses suicide as a cause of death in ranking of the 20th of the global mortality rate (16 of suicide per 100,000 people)[3,4]. Suicide frequently occurs every 40 seconds in the world[8]. Suicidal behaviors are influenced by interacting biological, genetic, psychological, social environmental, and situational factors. Risk factors of suicide include mental and physical illness, alcohol or drug abuse, chronic illness, acute emotional distress, violence, and a sudden and major change in an individual's life, such as loss of employment, or separation from a partner, etc.[9].

According to WHO report in 2002, Thailand was recognized for suicide in ranking of No.59 in the world with suicide-rate of 7.8 per 100,000 people. Ratio of males to females was 3.15:1[6]. The statistical data from Department of Mental Health, Ministry of Public Health of Thailand showed that the suicide-rate during 2000-2011 varied from 5.77 to 8.4 per 100,000 people (average 6.7 per 100,000 people) and the average ratio of male and female was 3.47:1[7].

From retrospective analysis of forensic postmortem suicide cases in Ramathibodi hospital, located in central Bangkok, in the present study, the average of suicide-rate was 4.08% (ranged from 2.53% to 6.91% per year). It was noticed that suicide-rate had trend to decrease between 2001 and 2010, with the peak of 6.91% in 2003 (Table 1). Males died from suicide more than females significantly in current study (p = 0.001) and the ratio was 4.3:1, higher than findings shown in the WHO report[6], the report from the Department of Mental Health of Thailand[7] and other reports[10,11] that suicide-rate of males was three to four times higher than females, except Chinese, females had higher suicide-rate than males[12].

The youngest and the oldest ages of suicide in the present study were seven and 91 years, respectively with an average of 37.38 years. The average age of suicide cases was significantly lower than the total average age of the autopsy cases. The highest rate of suicide was found in the age group of 21 to 30 years in both males and females. It was noticed that females had significant higher suicide-rate than males in this age group (41.8% vs. 31.5%). In addition, more than half of the overall suicide cases had the age of less than 40 years in both genders. This finding was similar to both previous researches from Thailand[11] and Euro-countries[13].

The frequent methods for suicide in the present study were hanging, falling from height, firearm injury, and toxic substance ingestion. Other methods were drowning, carbon monoxide poisoning, cut wound at wrist and multiple stab wounds[14]. From reviewing of 56 countries by WHO in 2008, hanging

was the most common method for suicide in both male and female[15]. A similar report from Thailand also showed the same most common method for suicide during 1998 to 2003[11]. The finding in the present report (Table 4) was similar that 64.7% in male, 50.9% in female and the total of 62.1% were dead by hanging. The second method of suicide was the falling from height of both genders but females had higher percentage than males (15.3% in males vs. 25.5% in females). The third method of suicide was different between male and female, i.e., the firearm was more frequent in males while toxic substance ingestion was more frequent in females.

The prevalence of HIV seropositive in suicide cases was 5.1% and in non-HIV was 4.0%. The suicide cases had HIV positive slightly higher than the non-HIV but no statistical significant (p = 0.322). This was quite different from other previous studies[16]. It might be due to many HIV-supportive campaigns were launched in Thailand. For the nationality, the foreigners committed suicide 10.2% and the Thai national 3.8%. It was surprisingly that the rate of foreigners committed suicide was significantly higher than Thai. This finding should be further studied to find the cause of suicidal tendency in foreigners living in Thailand.

The limitation of the present study was because the study was a retrospective study of forensic postmortem autopsy cases. It had limited clinical data of the deceased, and the environmental, socioeconomic, and other risk factors that affected suicidal behavior of the deceased could not be collected.

Conclusion

The analysis of suicide from autopsy cases in central Bangkok was done in the present study. It was found that the suicidal-rate was 4.08% of the overall forensic postmortem cases. Males committed suicide more than females with M:F ratio was 4.3:1. The average age was 37.38 years with the youngest at seven years and the oldest at 91 years. The peak of suicide was found in age group of 21 to 30 years in both genders. Hanging and falling from height were the most frequent methods for suicide in both genders, respectively. For the third frequent method, firearm and toxic substance ingestion were found in males and females, respectively. Male, younger age and foreigner were found significantly related to suicide. HIV seropositive was slightly increased in suicide cases but not statistical significant. Female with younger age was related to suicide more than male.

What is already known on this topic?

Factors related to suicide have been studied around the world for over a period of years. There are many attempts to study the relationship between various factors e.g. sex, age, time, place, method of suicide, causes of suicide and disease or behavior of people who are likely to commit suicide. Most studies have found that males are likely to commit suicide more than females and the average age is young adulthood. Almost all suicide cases occur in private home. Many Socio-economic factors are also associated with suicide. The most common method used for suicide in most countries is hanging. The second is different in each country.

What this study adds?

The present study examined factors associated with suicide in central Bangkok by analysis of autopsy cases in the Ramathibodi Hospital for 10 years. The suicide-rate was average 4.08%. Males had more suicide-rate than females with the ratio of M:F was 4.3:1 and higher than other place in the world that had average ratio of 3.4:1. The lowest age of suicidal case was seven years and the highest was 91 years. Although the average age of suicide was 37.38 years, the peak was found in the young adult (age group of 21-30 years).

The present study showed that male, younger age and foreigner were associated with suicide in Thailand. Hanging was the most frequent method of suicide, similar to other studies. However, the present study revealed the second most common was fall from height. The third frequent method, firearm and toxic substance ingestion were found in males and females, respectively. The HIV positive cases were slightly higher in suicide than non-HIV cases but no statistical significant.

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Potential conflicts of interest

None.

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การฆ่าตัวตาย: วิเคราะห์จากการชันสูตรพลิกศพทางนิติเวช ณ โรงพยาบาลรามาธิบดี พ.ศ. 2544-2553

วิชาญ เปี้ยวนิ่ม, กาญจนา สุจิรชาโต, สมิทธิ์ ศรีสนธิ์, จิตตา อุดหนุน, วิศาล วรสุวรรณรักษ์

ภูมิหลัง: *การฆ่าตัวตายเป็นเหตุของการเสียชีวิตที่สำคัญซึ่งพบได้ทั่วโลก การศึกษาเกี่ยวกับพฤติกรรมและปัจจัยเสี่ยงต่าง ๆ ที่เกี่ยวข้องจะทำให้ทราบข้อมูลที่เป็นประโยชน์ซึ่งอาจช่วยป้องกันการฆ่าตัวตายได้*

วัตถุประสงค์: *เพื่อศึกษาปัจจัยที่เกี่ยวข้องกับการฆ่าตัวตายจากการชันสูตรพลิกศพทางนิติเวชที่โรงพยาบาลรามาธิบดี ในช่วงเวลา 10 ปี*

วัสดุและวิธีการ: *ได้ทำการศึกษาเชิงพรรณนาย้อนหลังจากการชันสูตรพลิกศพทางนิติเวช จำนวน 7,102 ราย ที่โรงพยาบาลรามาธิบดี ระหว่างปี พ.ศ. 2544 ถึง พ.ศ. 2553 โดยทำการศึกษาเกี่ยวกับเพศ อายุ เชื้อชาติ ปี วิธีการฆ่าตัวตาย และการติดเชื้อเอชไอวี*

ผลการศึกษา: *จากการศึกษานี้พบว่า อัตราการฆ่าตัวตาย อยู่ระหว่างร้อยละ 2.53-6.91 (ค่าเฉลี่ย 4.08) พบมีการฆ่าตัวตายสูงสุดในปี พ.ศ. 2546 โดยอัตราการฆ่าตัวตายมีแนวโน้มลดลงเล็กน้อยทุกปี เพศชายพบอัตราการฆ่าตัวตายมากกว่าเพศหญิงในอัตราส่วน 4.3 ต่อ 1 (ชาย 235 ราย, หญิง 55 ราย) อายุที่พบระหว่าง 7-91 ปี แม้ว่าอายุเฉลี่ยของการฆ่าตัวตายเป็น 37.38 ปี แต่ช่วงอายุที่พบมากที่สุดอยู่ในวัยผู้ใหญ่ตอนต้นคือ 21-30 ปี พบความสัมพันธ์ระหว่างเพศชาย การมีอายุน้อย และการเป็นคนต่างชาติกับการฆ่าตัวตาย วิธีการฆ่าตัวตายที่พบบ่อยที่สุดคือการแขวนคอ รองลงมาคือการตกจากที่สูง (ร้อยละ 62.1 และ 17.2 ตามลำดับ) ในเพศชายจะเป็นการใช้ปืนยิงและในเพศหญิงจะใช้การรับประทานสารพิษเป็นอันดับสาม มีผู้ที่ฆ่าตัวตายคิดเป็นร้อยละ 5.1 ที่ติดเชื้อโรคเอดส์ และมากกว่าผู้ที่ไม่ได้ติดเชื้อโรคเอดส์เล็กน้อย (ร้อยละ 4.0) แต่ไม่พบนัยสำคัญทางสถิติ*

สรุป: *การฆ่าตัวตายมีความสัมพันธ์กับปัจจัยหลายประการ เพศชาย การมีอายุน้อย และการเป็นคนต่างชาติ มีความสัมพันธ์กับการฆ่าตัวตายในประเทศไทยอย่างมีนัยสำคัญทางสถิติ วิธีการฆ่าตัวตายที่พบบ่อยที่สุดคือการแขวนคอและการตกจากที่สูง*