

## Original Article

# Suicide Epidemiology and Characteristics among Young Iranians at Poison Ward, Loghman-Hakim Hospital (1997–2007)

Abdolkarim Pajoumand MD<sup>1</sup>, Haleh Talaie MD MPH<sup>1</sup>, Arezou Mahdavinejad MD<sup>1</sup>, Shirin Birang MD<sup>3</sup>, Mahboubeh Zarei MD<sup>2</sup>, Fatemeh Fereshteh Mehregan MD<sup>4</sup>, Babak Mostafazadeh MD<sup>1,2</sup>

## Abstract

**Background:** Suicide is a critical public health problem. In developing countries, the highest suicide rate is found in young adults with remarkable increasing rate. In this study, we have evaluated the epidemiology and characteristics of 8–16-year-old individuals who attempted suicide and were hospitalized in Loghman-Hakim Hospital, Tehran, Iran from 1997 to 2007.

**Methods:** A total of 6414 hospitalized patients, ages 8–16, who attempted suicide and were residents of Loghman-Hakim Hospital were investigated. We performed a retrospective chart review to study the characteristics of cases in a 10-year period by review of psychiatric and medical records.

**Results:** Out of 6414 patients 22.6% were male, 5978 patients were 12–16 years old and the rest were aged 8–12 years. During the 10-year period, suicides showed a rising trend among adults, while in children no significant increase was detected. Communicative disorders were the most common underlying risk factors, particularly in females. One patient out of five cases had psychiatric disorders, of which adjustment disorders were the most predominant. A remarkable peak in suicides was observed in May and July, while winter had the highest suicide rate among seasons.

**Conclusions:** Suicide due to drug overdose is higher in females than males in young population. This increasing trend is a psychiatric concern and should be resolved by improving mental and public health.

**Keywords:** Poisoning, psychiatry, suicide, youth

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## Introduction

Suicide is recognized as a major public health problem throughout the world.<sup>1</sup> There are nearly 900,000 suicides worldwide each year, including as many as 200,000 adolescents and young adults. Suicide in children and adolescents is a national and global phenomenon.<sup>2</sup> Lack of scientific knowledge about suicide attempts in youth is because of the limited research on this subject in addition to the conclusion of some researchers that suicide is beyond children's capabilities.<sup>3,4</sup> Before puberty, the prevalence of suicide attempts is rare and increases during adolescence. Because of the growing risk for suicide with increasing age, adolescents are the main target of repeated suicide attempts.<sup>5,6</sup>

A variety of global suicide rates depends on local factors such as data collection and reporting methods.<sup>7</sup> Suicide rates lower than 6.5 per 100,000 have been reported in Latin America and Middle Eastern Arabic countries. The highest rates have been reported from Finland, Latvia, Lithuania, New Zealand, the Russian Federation, and Slovenia with rates over 30 per 100,000.<sup>8</sup> In industrialized countries, males commit suicide 4 times as often as females.

The exact place that suicide has in the deaths of adolescents and

young people depends on what other factors are operational in that country.<sup>9</sup> Abuse, loss of friends (including boyfriend or girlfriend), substance abuse, academic failure, family discord, legal/disciplinary problems, school concerns, and mental health conditions such as depression increase the risk for suicide among youths of both sexes.<sup>2</sup> Sex differences in suicide attempt rates are considerable, but the pattern of sex differences is not same between countries.<sup>7</sup>

Self-poisoning is one of the prevalent methods used for attempting suicide. It seems attempted suicide among children is more common than estimated. Recent studies report that the suicide rate among children aged 5–14 years is 1–2 deaths per 100,000 and among youth aged 15–19 years, it is 11 deaths per 100,000.<sup>7</sup> This age selection is based on a recommendation by Margaret Thompson (Head of Ontario, Canada Poison Center). According to a study performed in Iran in 1997, poisoning occurred more common at ages 2–6 years for children and 21–40 years for adults. The most common route of poisoning was oral intoxication, particularly drugs, which has been confirmed by a recent report in 2007. Intentional poisoning has been reported 4 times more than unintentional cases.<sup>10,11</sup>

The aim of this study was to describe the epidemiology and characteristics of 8–16-year-old individuals who attempted suicide (parasuicide) and were hospitalized in Loghman-Hakim Hospital, Tehran, Iran during a 10-year period (1997 to 2007). Male and female suicide attempts were compared with respect to psychiatric disorders, reason for suicide, seasonality, and educational level. Parasuicide is an apparent attempt at suicide, commonly called a suicidal gesture, in which the aim is not death.

**Authors' affiliations:** <sup>1</sup>Toxicological Research Center, Loghman-Hakim Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran. <sup>2</sup>Poison Center, Loghman-Hakim Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran. <sup>3</sup>Radiology Ward, Loghman-Hakim Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran. <sup>4</sup>Pediatric Ward, Loghman-Hakim Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

**•Corresponding author and reprints:** Haleh Talaie MD MPH, Toxicological Research Center, Loghman-Hakim Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran. Tel: +98-215-541-8175, Fax: +98-215-540-8847, E-mail: talaie@sbmu.ac.ir.

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**Table 1.** Frequency of attempted suicides among 8–16 year olds admitted to Loghman-Hakim Hospital.

Age group	Female		Male		Total	
	Number	%	Number	%	Number	%
8–12 year olds	289	66.3	147	33.7	436	100
12–16 year olds	4674	78.2	1304	21.8	5978	100
Total	4963	77.4	1451	22.6	6414	100

**Table 2.** Motivations and reasons for attempted suicides among 8–16 year olds admitted to Loghman-Hakim Hospital.

Motivations and reasons for suicide attempt	Number	%
Substance abuse	88	7.7
Communicative disorder	666	58.4
Economic problem	18	1.6
Family loss	87	7.6
Sudden changes in mood	53	4.6
Familial history of substance abuse	8	0.7
Parental divorce	15	1.3
Parental discord	21	1.8
Educational issues	41	3.6
Combination of the above reasons	60	5.3
Others	84	7.4
<b>Total</b>	<b>1141</b>	<b>100</b>

**Table 3.** Month variations of attempted suicides.

Month	Age group							
	8–12 year olds				12–16 year olds			
	Female		Male		Female		Male	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
January	7	4.8	26	9.3	109	8.4	348	7.5
February	14	9.5	18	6.4	135	10.4	427	9.2
March	17	11.6	11	3.9	119	9.2	435	9.4
April	16	10.9	40	14.3	118	9.1	386	8.3
May	19	12.9	20	7.1	97	7.5	467	10.1
June	13	8.8	19	6.8	99	7.6	439	9.5
July	6	4.1	23	8.2	80	6.2	401	8.6
August	16	10.9	31	11.1	123	9.5	441	9.5
September	12	8.2	20	7.1	101	7.8	345	7.4
October	9	6.1	13	4.6	72	5.6	245	5.3
November	9	6.1	33	11.8	94	7.3	317	6.9
December	9	6.1	26	9.3	148	11.4	388	8.4

## Materials and Methods

In this cross-sectional retrospective study, 6414 individuals that had attempted suicide were recruited. The study population consisted of hospitalized patients in the age range of 8 to 16 years old that attempted suicide and were residents in the Poison Center of Loghman-Hakim Hospital from 1997 to 2007. Loghman-Hakim Hospital is a unique poisoning referral center in Tehran, Iran that admits patients from all cities in Tehran Province. Annually, around 20,000 hospitalized patients are observed and treated in this center. The daily turn-over in this center is 80–100 patients.

We performed a retrospective chart review in this referral center to study the seasonality and characteristic of patients who attempted suicide during a 10-year period. Patients' sex; age; education level; history of attempted suicide; method of suicide; reasons for suicide such as substance abuse, communicative disorder, economical issues, parental discord, loss and divorce, family history of addiction, educational problems, mood disorder, and psychiatric diagnosis that included depression, adjustment, bipolar, anxiety, personality and psychotic disorders; as well as the season in which the suicide attempt was made were all extracted by a review of psychiatric and medical records. Gender differences and seasonal distribution of suicides were tested with the

Chi-square test. *P*-values equal to or less than 0.05 were considered significant.

## Results

Over a 10-year period (1997–2007), 6414 attempted suicides in young people aged 8 to 16 were registered in Loghman-Hakim Hospital. Of these, 1451 (22.6%) were male and 4963 (77.4%) female. The following suicide distribution was observed according to age groups and sex: females at 8–12 years old ( $n = 289$ ; 66.3%) and females at 12–16 years old ( $n = 4674$ ; 78.2%). Males were less prevalent in both age groups (Table 1). According to the etiologic reasons of attempted suicides, communicative disorders were the most common underlying risk factors followed by substance abuse and family conflict (Table 2). Communicative disorders in females were reported higher than in males.

Evaluation of underlying psychiatric disorders showed that about 1 out of 5 cases with attempted suicides had psychiatric disorders, most of whom suffered from adjustment disorders. A history of attempted suicide was found in 1 out of 7 cases in our study population with no difference in gender. Most were students; less than 1% were illiterate.

There was a remarkable increase in suicides observed both in

**Table 4.** Seasonal variations of attempted suicides

Age group	Season							
	Winter		Spring		Summer		Autumn	
	Number	%	Number	%	Number	%	Number	%
8–12 year old males	39	27.1	44	30.6	35	24.3	26	18.1
8–12 year old females	44	20.5	60	27.9	77	35.8	34	15.8
Total 8–12 year olds	83	23.1	104	29	112	31.2	60	16.7
12–16 year old males	382	29.4	286	22	308	23.7	322	24.9
12–16 year old females	1304	28	1189	25.6	1189	25.6	971	20.9
Total 12–16 year olds	1686	28.3	1475	24.8	1497	25.2	1294	21.7

males and females in May and July, while males had the greatest frequency in December and females in May, when separately analyzed. Suicide frequencies showed the lowest rate for the overall data in October (Table 3). The peak of suicides occurred in the summer among 8–12 year olds whereby the highest suicide rate among 12–16 year olds was reported during the winter. Generally, over the study period, suicide occurrence was obviously higher during the winter in both males and females (Table 4).

From 6101 eligible cases, the most important cause of patient suicide was drugs (91.7%), followed by pesticides (8.1%), self-infliction (0.1%), and substance abuse (0.2%). In the 8–12-year-old cases, the most common drugs of poisoning were TCA (imipramine, amitriptyline; 22%), benzodiazepine (lorazepam, diazepam; 18.3%), and anticonvulsive drugs (phenobarbital, carbamazepine; 14.7%). In 12–16-year-old cases, sedative-hypnotics (33.1%) were the dominant drug type used by patients who attempted suicide by drug poisoning, followed by psychotropics (27.3%), and analgesics (17.6%). The most common pesticides for poisoning were organophosphates (63%) followed by carbamates (30%).

In 1684 out of 6554 patients with sufficient data for diagnostic assessment, there were 901 (53.5%) adjustment disorders, 441 (26.2%) mood disorders, 132 (7.8%) personality disorders, 37 (2.2%) anxiety disorders, 39 (2.3%) bipolar disorders, 32 (0.8%) psychotic disorders, and 121 (7.2%) had more than one of the above mentioned disorders. In our study, 536 (14.5%) out of 3687 patients had a record of a previous suicide attempt. There were 301 patients (56.2%) who had one previous suicide attempt, 46 (8.6%) had 2 previous attempts, 35 (6.5%) attempted 3 times, and 23 patients (4.3%) had attempted more than 3 times. In 131 patients (34.4%) there were no previous suicide attempts.

During this 10-year period from 1997 to 2007, suicide attempts showed a rising trend among adults while the trend in children showed no significant peak. The number of attempted suicides showed an increase from 1997 to 1998 with an apparent peak while there was a decreasing trend until 2002. In the last 5 years, the increase in suicide attempts was noted among 12–16-year-old children.

## Discussion

The present findings show that there were 6414 cases of attempted suicide admitted to the Poison Center of Lohman-Hakim Hospital with the age range of 8 to 16 years during a 10-year pe-

riod from 1997 to 2007. All cases had attempted suicide by using therapeutic drugs. According to the studies performed in Lohman-Hakim Poison Center, the most important agents of acute poisoning were drugs (69.13%). Sedative-hypnotics followed by opioids (12.34%) and organophosphates (6.21) were reported to be the most common agents in 2003, which corresponded with our results, while in 1997 benzodiazepines (24.5%) were most frequent, followed by antidepressants (20.5%), and analgesics (18%).<sup>10,11</sup> In China, more than 60% of suicide deaths occurred by pesticides.<sup>12</sup> In Sweden, drug poisoning was found as the most common suicide method in nearly every second woman and every fifth man who committed suicide.<sup>13,14</sup>

A rising trend for suicide attempts was found within the period of 1997 to 2007 among adults while no significant change was observed for children. Another report from the USA showed that during 1992–2001, the suicide rate for individuals aged 10–19 declined from 6.2 to 4.6 per 100,000.<sup>12</sup> The rising rates of youth suicide have been clearly evident in developed countries such as Australia and New Zealand since the 1970s.<sup>15</sup>

It is considerable that contrary to international reports, a higher incidence of poisoning is shown in females than males in all age groups, at a ratio of 3.5:1.<sup>16,17</sup> The increasing rate of acute poisoning in females is for their much more communicative disorder.

Drug overdose is more common in females throughout the world. Ghazinour et al. have studied parasuicide for the period of 2000–2004 in an overall age range and reported that females outnumbered males in the age category of 10–19 years, but in males was contrary after the age of 20 years.<sup>18</sup> Mello-Santos et al. from Brazil have reported 3-times more suicide attempts for males compared to females during 1998–2000.<sup>19</sup>

Psychological disorders were diagnosed in 20% of our study population. The high rate of adjustment disorders among cases with suicide attempts (54%) agreed with other international studies that have identified various risk factors for suicide, including depression, alcoholism, and schizophrenia.<sup>20,21</sup> The frequency of depressive disorders among females in the present study was 24%, which was lower than the 50% among adolescents as reported by Shaffer et al.<sup>22</sup> in 1988, and higher than females under the age of 30 (18%) according to Asgard. Psychiatry interviews were not performed for all of our study population, which might skew the results.<sup>23</sup>

The proportion of victims with previous suicide attempts in the present study was 14%, which was lower than the rate of 80%

among Swedish females aged 15 to 29 years as reported by Asgard in 1990.<sup>23</sup> Marttunen et al. studied suicide attempts among 13 to 22 year olds and reported that females were more likely to have a previous suicide attempt than males, while the present study results have revealed no differences in previous suicide attempts among genders.<sup>24</sup> The inconsistent findings probably reflect differences in subjects' ages and methodologies between studies.

In our study, the greatest suicide frequencies were found in May and July, the school examination months. As previously reported, school problems might trigger suicide among adolescents.<sup>25,26</sup> These findings suggest the critical role of public awareness about impact of school problems on youth suicidal behavior.<sup>25,27</sup> Ung EK in 2003 has reported a greater occurrence of suicides among youth in Singapore during the months of June, October, November, and December.<sup>28</sup> A 10-year review of suicide in the United States revealed that suicide peaked in September for the 11–17 year olds and the highest percentage of cases among the 18–24 year olds occurred in January.<sup>29</sup> Seasonal assessment in the present study showed a higher suicide frequency during winter, which contrasted a study by Ajdacic-Gross V et al.<sup>30</sup> In Ajdacic-Gross V et al. study, suicide frequencies peaked in spring and early summer, and were lower in autumn and winter. They have suggested the probable role of increased sociological arguments and higher level of social activity in spring and summer. These social tensions lead to a seasonal peak in the second quarter of the year.<sup>30</sup>

Suicide rates among young people are high, particularly among females. This accelerated rate needs more attention to youth psychosocial issues. Fundamentally, more awareness may lead to better mental and public health. It is suggested that socio-familial issues that lead to harm for the youth must be taken much more seriously in Iran. Screening of these risk factors by mental health workers among the youth would be a primary step to prevent suicide.

## Declaration

The Ethical Committee of Shahid Beheshti University of Medical Sciences approved the study protocol, with code number 10.

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