

PAPER

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Antidepressants at Autopsy in Hispanic Suicidal Youth in Miami-Dade County, Florida*

ABSTRACT: Controversy has surrounded the use of antidepressants and suicidal behaviors in youth. This study reviewed the Medical Examiner's Office records of 253 persons aged 24 years or younger classified as suicides in Miami-Dade County, Florida, from 1990 to 2007. Information was collected regarding demographic information, suicidal characteristics, psychiatric and psychosocial factors, and toxicology results. Eighty-five percent of the sample was men, and 53.4% of the subjects were Hispanic. Consistent with previous literature, the existence of antidepressants at autopsy was rare; present in only 6% ($n = 15$) of the victims. The occurrence of antidepressants was not significantly different between Hispanics ($n = 7$) and non-Hispanics ($n = 8$). The incidence of antidepressants was weakly correlated with a tendency to be men and no history of psychiatric illness. The presence of antidepressants in Hispanic youth suicide victims was similar to non-Hispanics.

KEYWORDS: forensic science, suicide, antidepressants, Hispanics

Youth suicide continues to be an important health problem in the United States. In 2006, suicide was the third leading cause of death in people aged 10–24 years. In children aged 10–14 years, the rate was 0.5 per 100,000, but increased to 9.9 per 100,000 among adolescents and young adults aged 15–24 years (1).

Recent controversies regarding the relationship between suicidal behaviors and the use of antidepressants have dominated the scientific literature and lay press (2–4). In May 2003, U.K. regulators questioned a potential increased risk of suicidal behaviors in clinical trials data involving paroxetine. They concluded that the balance of risks and benefits for the treatment of depression in children and adolescents was unfavorable for all antidepressants except fluoxetine (5).

The U.S. Food and Drug Administration (FDA) held a series of meetings in 2004 to address the issue. The FDA committee reviewed 25 clinical trials involving more than 4300 child and adolescent patients who received any of nine different antidepressant medications. No suicides occurred in any of these studies. Extensive analysis of the data from these trials supported the theory that the medications “increased the risk of suicidal thinking and behavior in short-term studies of children and adolescents” with depression. This process resulted in the requirement of a “black box” label for all antidepressants regarding the need to monitor for worsening clinical symptoms and suicide risk in children, adolescents, and adults taking antidepressants (6).

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Controversies regarding treatment with antidepressant medications and suicidal behaviors can be traced back to 1960 when Mayer-Gross and colleagues reported observations of depressed patients during initial treatment with tricyclic antidepressants (TCA) and noted that: “With beginning convalescence, the risk of suicide once more becomes serious as retardation fades” (7, pp. 231). In 1990, Teicher and colleagues reported on a series of six adult patients with depression who, according to the authors, became suicidal as a result of being treated with fluoxetine (8).

More recent studies have examined the relationship between antidepressant use and suicidal behaviors. The association between antidepressants and suicide attempts has been mixed. Some reports have revealed a negative relationship between antidepressant use and suicide attempts in children and adolescents (9,10), whereas other studies have reported a positive relationship between antidepressant use and suicidal behaviors (11–13).

As suicide attempts and deaths can be distinct phenomena, our focus will be primarily on those reports addressing suicide deaths. Many studies have reported an inverse relationship between the use of antidepressants and suicide deaths (14–18).

Several studies have revealed mixed results or have been unable to establish a direct relationship between suicide deaths and antidepressant use (19–21). Gibbons et al. (19) and Isacson et al. (20) found that selective serotonin reuptake inhibitors (SSRIs) had lower relative risk in suicides compared with non-SSRIs. In contrast to SSRIs, both of these studies showed a positive relationship between the presence of TCAs and suicide rates in adolescents.

One study found that antidepressant drug treatment might be related to suicide deaths in children and adolescents. Olfson et al. (12) reported that in adults (aged 19–64 years) antidepressant drug treatment was not significantly associated with suicide deaths, but in children and adolescents (aged 6–18 years) antidepressant drug treatment was significantly associated with suicide deaths.

Only a handful of studies have examined the presence of antidepressants at autopsy in suicidal youth. Isacson et al. (20)

searched for different antidepressants in the forensic toxicological screening of 14,857 suicides and compared that with 26,422 cases of deaths by accident or natural causes in Sweden between 1992 and 2000. Antidepressants were detected in the 3411 suicides and in 1538 controls. In the 52 suicides under 15 years of age, seven were positive for antidepressants (clomipramine, imipramine, maprotiline, trimipramine, mianserin, and venlafaxine). No SSRI was detected in any victims <15 years of age. Among the 326 cases of suicide in the 15–19-year age group, 13 cases (4%) were positive for antidepressants. SSRI had lower relative risk in suicides compared with non-SSRI. They concluded that treatment of depressed individuals with SSRI did not lead to an increased risk of suicide in adults, children, or adolescents.

Leon et al. (22) conducted a medical examiner surveillance study to measure serum toxicology for antidepressants for suicide victims younger than 18 years in New York City from 1999 to 2002. Because only one of 36 victims studied was found to present with toxicological evidence of antidepressants at the time of exam, they concluded the detection of antidepressants at autopsy was quite rare.

In a study similar to ours, Singh and Lathrop (23) reviewed autopsy and field reports for all pediatric suicide cases referred to the New Mexico office of the medical investigator from 1979 to 2005. They found that the adjusted suicide rate was 4.8 per 100,000. Psychological stressors and para-suicidal behaviors were identified in some cases. Seventy-six percent of suicides occurred in the victim's home yard, and 25% left a suicide note. In 26% of cases, alcohol or other drugs were detected postmortem. The most common methods used to commit suicide were firearms (58%) followed by hanging (30%). Although the age-adjusted suicide rate is higher in New Mexico than nationally, the trends in the population are similar. Less than 5% of decedents had detectable levels of any psychiatric drugs. Unfortunately, the specific types of drugs detected at autopsy were not reported.

Similarly, Vieweg et al. (24) examined records from the office of the Medical Examiner of Virginia from 1987 to 2003 with the goal of getting a better understanding of suicides in children and adolescents. This study demonstrated that suicide accounted for 16.8% of all unnatural deaths. Firearms were the most common method of death for suicides followed by hanging and poisoning. Poisoning other than carbon monoxide accounted for 7.8% of suicides with antidepressants. Female youths were 10 times more likely to die from TCA ingestion than male youths, after adjusting for race and age. Among the antidepressants, TCA was the most common poison used in suicide.

Suicide among Hispanic youth in the United States remains a complex and multidimensional problem. Among the factors known to play a role in the rate of suicide in youth are biological, psychological, social, and cultural factors. Those variables also believed to play a role in Hispanic youth in the United States are male sex, the presence of a psychiatric diagnosis, and acculturation issues (25). An added factor that may play a role is the use of antidepressant medications. Although it has been reported that Hispanics appear to suffer from the same psychiatric problems that Caucasians do, they have been less likely to receive mental health treatment placing them at higher risk of depression and consequently to suicide (16,26,27). The lack of access to appropriate mental health treatment suggests that Hispanic youth may receive less frequent or appropriate treatment for depression (including less likely to be treated with antidepressant medications).

An extensive review of the literature (PubMed, Medline, and PSYcline) did not reveal any studies that examined the issue of antidepressant use in Hispanic youth suicide victims in the United

States. Approximately 35.3 million people self-identify as Hispanics in the United States and comprise 61% of the population of Miami-Dade County, Florida (28,29). Therefore, we are situated in a unique position to address a variety of issues as they pertain to the Hispanic population. This study was designed to address the following questions: (i) What was the frequency of the presence of antidepressants in young suicide victims? and (ii) Is the frequency of toxicological evidence of antidepressants different between Hispanic and non-Hispanic youth suicide victims? We hypothesized that the presence of antidepressants would be less frequent in Hispanic youth suicide victims than non-Hispanic youth suicide victims.

Methods

Subjects

A sample ($N = 253$) of persons 24 years of age or younger whose deaths were classified as suicide by the Medical Examiner's Office in Miami-Dade County, Florida, from 1990 to 2007 was analyzed in this study. Information from each file was extracted from the Death Certificate, the investigating police officer's report, the Medical Examiner's report (including the toxicological analysis), and any other information contained in the charts.

Measures

Suicide victims' charts were abstracted, and information was collected in the following categories: (i) demographic information, i.e., age, gender, ethnicity, marital status, living situation, and highest level of education achieved; (ii) characteristics of the suicide, i.e., date, time of day, method, and location of suicide and the presence of a suicide note; (iii) psychosocial factors, i.e., documented history of psychiatric illness and psychiatric treatment, past suicide attempts, legal history, stressors, and family history of psychiatric diagnoses; and (iv) toxicology, i.e., type of toxicology report and the presence of antidepressants and other drugs.

Data Analysis

Data were analyzed using SPSS 15.0 software (SPSS, Inc. Chicago, IL). Frequency and descriptive statistics were calculated to check all relevant characteristics of the data. The presence of antidepressants was correlated with phi coefficients with demographic characteristics, suicide characteristics, and the psychosocial history variables and characteristics to determine any significant associations. We used chi-square goodness of fit tests to investigate differences in suicides by year, month of the year, and day of the week. Chi-square tests of independence were utilized to compare gender and ethnicity (Hispanic vs. non-Hispanic) with the presence of antidepressants for the total sample, those victims 18 years of age and younger, and those victims 19 years of age and older. We employed the $\alpha = 0.05$ level of significance in this study.

Results

The average age of the subjects was 20.3 years ($SD = 2.6$; $R = 11, 24$). Eighty-five percent ($n = 215$) of the sample was men, and 53.4% ($n = 135$) of the subjects were Hispanic, 26.9% ($n = 68$) of the subjects were Caucasian, 15.4% ($n = 39$) of the subjects were African-American, and 4.3% ($n = 11$) of the subjects were of other ethnic origin. Just under 87% ($n = 219$) of the sample was single. Seventy percent ($n = 177$) had been living with

TABLE 1—Demographic characteristics.

Variable	Category	Total Sample (N = 253)
Age	—	M = 20.3, SD = 2.6, R = 11, 24
Gender	Male	215 (85.0%)
	Female	38 (15.0%)
Marital status	Single	219 (86.6%)
	Married	14 (5.5%)
	Divorced	5 (2.0%)
	Widowed	1 (0.4%)
	Unknown	14 (5.5%)
Highest level of education	Less than high school graduate	47 (18.6%)
	High school graduate	22 (8.7%)
	College grad	35 (13.8%)
	Postgraduate	1 (0.4%)
	Unknown	148 (58.5%)
Living situation	Alone	19 (7.5%)
	Family	177 (70.0%)
	Friends	13 (5.1%)
	Homeless	5 (2.0%)
	Other	17 (6.7%)
	Unknown	22 (8.7%)
	Ethnicity	White
	Black	39 (15.4%)
	Hispanic	135 (53.4%)
	Other	11 (4.3%)

family, 7.5% (n = 19) alone, 6.7% (n = 17) in another residence, 5.1% (n = 13) with a friend, 2% (n = 5) were homeless, and 8.7% (n = 22) had an unknown status. Almost 59% (n = 148) had an unknown educational level, whereas 18.6% (n = 47) had not graduated high school, 13.8% (n = 35) had attended college, 8.7% (n = 22) were high school graduates, and one had attended post-graduate college (see Table 1).

The number of suicides did not vary by year, as the frequency remained consistent over the period from 1990 to 2007 ($\chi^2 = 11.9$ [12], $p = 0.46$) with the fewest occurring in 1990 (n = 12) and the most occurring in 2007 (n = 27). The month of committed suicides did not vary ($\chi^2 = 10.4$ [11], $p = 0.50$) with the fewest occurring in March (n = 12) and the most occurring in September (n = 28). The day of the week for committed suicides did not vary ($\chi^2 = 2.9$ [6], $p = 0.82$) with the fewest occurring on Wednesday (n = 32) and the most occurring on Tuesday and Saturday (n = 42). Almost 61% (n = 153) subjects committed suicide at home, 13% (n = 32) on the street, 5% at a friend's (n = 12), 4% (n = 10) at a hotel, 2% at another family member's place (n = 4), 16% (n = 40) at other locations, and 1% (n = 2) were unknown. The primary method of suicide was by firearm (53%; n = 133), followed by hanging (24%; n = 60), other methods (13%; n = 33), overdose (6%; n = 16), drowning (2%; n = 5), asphyxiation (2%; n = 4), cutting/stabbing (1%; n = 1), and one case was unknown. Nineteen percent (n = 48) of the cases had left a suicide note. Approximately 14% (n = 36) of the cases had past attempts at suicide with 25% (n = 64) of the cases unknown (see Table 2).

Whereas the majority of the cases had an undetermined family history of psychiatric illness (91%; n = 231), under 4% (n = 9) were found to have at least one family member with documented psychiatric illness. Almost 45% (n = 112) of the cases were found to have a personal history of psychiatric illness, but nearly 20% (n = 50) of the subjects were unknown. About 8% (n = 21) of the cases were known to have a history of psychiatric treatment with 30% (n = 77) unknown. About 19% (n = 49) had some type of legal history, whereas 53.8% (n = 136) were unknown. Almost 76% (n = 192) had stressors of some type in their lives, whereas 20% (n = 50) were not known (see Table 3).

TABLE 2—Suicide characteristics.

Variable	Category	Total Sample (N = 253)
Place of suicide	Home	153 (60.5%)
	Other family home	4 (1.6%)
	Friend	12 (4.7%)
	Street	32 (12.6%)
	Hotel	10 (4.0%)
	Other	40 (15.8%)
Method of suicide	Unknown	2 (0.8%)
	Firearm	133 (52.6%)
	Cutting/stabbing	1 (0.4%)
	Hanging	60 (23.7%)
	Overdose	16 (6.3%)
	Asphyxiation	4 (1.6%)
	Drowning	5 (2.0%)
Presence of note	Other	33 (13.0%)
	Unknown	1 (0.4%)
	Yes	48 (19.0%)
Past suicide attempt	No	195 (77.1%)
	Unknown	10 (4.0%)
	Yes	36 (14.2%)
	No	153 (60.5%)
	Unknown	64 (25.3%)
	Yes	36 (14.2%)

TABLE 3—Psychosocial history and characteristics.

Variable	Category	Total Sample (N = 253)
Family history of psychiatric illness	Yes	9 (3.6%)
	No	13 (5.1%)
	Unknown	231 (91.3%)
Victim history of psychiatric illness	Yes	112 (44.3%)
	No	88 (34.8%)
	Suicide attempt only	3 (1.2%)
Victim history of psychiatric treatment	Unknown	50 (19.8%)
	Yes	21 (8.3%)
	No	155 (61.2%)
Victim legal history	Unknown	77 (30.4%)
	Yes	49 (19.4%)
	No	68 (26.9%)
Stressors	Unknown	136 (53.8%)
	Yes	192 (75.9%)
	No	11 (4.3%)
	Unknown	50 (19.8%)

TABLE 4—Comparisons for gender and ethnicity for use of antidepressants.

Variable	Category	Antidepressants (n = 15)	No Antidepressants (n = 238)	Statistic, p-Value
Total sample		(n = 15)	(n = 238)	
Gender	Female	5 (13.2%)	33 (86.8%)	$\chi^2(1) = 4.2,$ $p = 0.04$
	Male	10 (4.7%)	205 (95.3%)	
Ethnicity	Non-Hispanic	8 (6.8%)	110 (93.2%)	$\chi^2(1) = 0.3,$ $p = 0.59$
	Hispanic	7 (5.2%)	128 (94.8%)	
≤18 years of age		(n = 4)	(n = 54)	$\chi^2(1) = 0.8,$ $p = 0.37$
Gender	Female	0	9 (100%)	$\chi^2(1) = 1.4,$ $p = 0.24$
	Male	4 (8.2%)	45 (91.8%)	
Ethnicity	Non-Hispanic	3 (11.1%)	24 (88.9%)	$\chi^2(1) = 8.6,$ $p = 0.01$
	Hispanic	1 (3.2%)	30 (96.8%)	
≥19 years of age		(n = 11)	(n = 184)	
Gender	Female	5 (17.2%)	24 (82.3%)	$\chi^2(1) = 0.01,$ $p = 0.93$
	Male	6 (3.6%)	160 (96.4%)	
Ethnicity	Non-Hispanic	5 (5.5%)	86 (94.5%)	$\chi^2(1) = 0.01,$ $p = 0.93$
	Hispanic	6 (5.8%)	98 (94.2%)	

Ninety-five percent ($n = 240$) had a serum toxicology report, 76% ($n = 192$) had a urine report, 8.3% ($n = 21$) had a gastric report, and 10.3% ($n = 26$) had another type of report. Approximately 90% ($n = 228$) did not have any kind of antidepressants according to the toxicology report, whereas 6% ($n = 15$) had evidence of taking an SSRI, serotonin norepinephrine reuptake inhibitor (SNRI), TCA, or other type, and 4% ($n = 10$) were unknown. Other drugs present among these cases included the following: alcohol (31.6%; $n = 80$), stimulants (17.8%; $n = 45$), opioids (6.7%; $n = 17$), hallucinogens (1.2%; $n = 3$), benzodiazepines (12.3%; $n = 31$), other types (13.0%; $n = 33$), none (38.3%; $n = 97$), and unknown (5.9%; $n = 15$).

The presence of antidepressants was weakly correlated with a tendency to be women ($r = 0.13$, $p = 0.04$) and no history of psychiatric illness ($r = 0.25$, $p < 0.001$). No other significant correlations were found.

For the total sample and those victims 19 years of age and older, a higher percentage of women were found to have used antidepressants. No other comparisons were significant (see Table 4).

Discussion

The major finding of this study was that women for the total sample and for those at least 19 years of age were found to have been using antidepressants compared to men. The overall sample showed that 13% of women had a presence of antidepressants on toxicology reports versus 4% in men. At least one previous study demonstrated similar results, where the presence of antidepressants at autopsy was more frequent in female rather than male youth suicide victims (24). The relatively small number of women in each sample and each study's methodologies limit the gender-specific conclusions to be drawn. Our study was not designed to examine treatment emergent suicidal behaviors. Thus, we are not able to determine whether antidepressants have a gender-specific effect in stimulating suicidal behavior.

Our sample was comprised predominantly of men (85%) and Hispanics (53.4%). We found that most of the subjects were living with family at the time of suicide, which suggests some kind of familial support. Also, most of suicides were committed at home (60.5%). The number of suicides did not vary by year, month, or day of the week.

Consistent with existing literature, the primary method of suicide utilized by this sample was firearms (53%), followed by hanging (24%) (23,24). Even though 85% of our sample was men, firearms were also the primary method of suicide for the women. Only 19% left a suicide note. These results are consistent with previous local (30) and national (23) reports.

Two hundred and forty subjects had a serum toxicology report present in the Medical Examiner's file. The toxicology results revealed that *c.* 90% of our sample did *not* have any kind of antidepressant, and only 6% showed presence of an antidepressant (SSRI, SNRI, TCA, or other). Among other substances, alcohol was present in 31.6% of cases.

Some of our study findings are also consistent with previous studies (23,24). First, men complete suicide more frequently than women. Completed suicides often involve violent means with firearms and hanging being the two most common methods used. This highlights the importance of screening for access to firearms in an adolescent suicide risk assessment. Substance use, abuse, and/or intoxication continues to be a psychiatric morbidity risk factor for completed suicides with alcohol being the substance most often present in toxicology reports. In most of the cases in the current study, an acute stressor preceded the completed suicide, most typically interpersonal romantic conflicts.

Poor support systems have been identified as a risk factor for suicide (25). Most of the subjects in this study lived with their family, and most of the suicides occurred at home. Although this finding would suggest the victims had some familial support, which could be protective, clearly other unknown mediating factors were at play.

One of the aims of this study was to determine the presence of antidepressants in young suicide victims. Our study discovered that only 6% of suicide victims had toxicological evidence of an antidepressant. Previous reports have documented the incidence of antidepressants at autopsy in child and adolescent suicide victims to be between 3 and 5% (20,22,23). These findings show that many youth who commit suicide are not using antidepressant medications at the time of their deaths, thus providing indirect evidence that the use of antidepressants does not pose a risk factor for completed suicides. The limitations of this type of ecological study do not permit further generalization of these findings. The low frequency of antidepressants may indicate that treatment with these medications is not the main factor leading to suicide in this age group.

More than 90% of people who die by suicide have depression, other mental disorders, and/or a substance abuse disorder (26,31). This may suggest that suicidal youth are not receiving adequate treatment for their psychiatric problems, and the untreated psychiatric problem is the main variable that places the youngster at risk for suicide. Needless to say, further, more sophisticated research, such as case controlled studies, would be required to address these questions.

The second aim of our study was to compare the presence of antidepressants in Hispanic versus non-Hispanic youth suicide victims in Miami-Dade County, Florida. Contrary to our hypothesis, we did not find a difference in the presence of antidepressants between the two groups. Furthermore, our results did not support an age effect with no significant difference being found in the teenage group (15–19-year olds) and young adult group (20–23-year olds). To our knowledge, this is the first study examining this issue in Hispanic youth in the United States.

Several factors could explain the similarities in the frequency of antidepressants between Hispanic and non-Hispanics suicide victims in this study. First, the Miami metropolitan area is a multicultural city, and the state promotes public health programs and low-cost health care services, which are more available to the underserved and minority populations. Therefore, both groups that we studied could have had similar access to health care services in the local area. Second, it is possible that Hispanic youth presented with similar psychiatric morbidities (e.g., depression) as their non-Hispanic counterparts. Such similarities may parallel the use or lack of the use of antidepressants between Hispanic and non-Hispanic suicide victims. Third, Hispanics and non-Hispanics appear to share similar stressors common to adolescents in general. The presence of interpersonal conflicts was identified as the most common stressor in both groups of youth. Although Hispanic youth may have to deal with stressors particular to their minority group, such as separation from other family members and acculturation issues, they were not identified in the Medical Examiner's records. To address these issues, one would have to examine both individual and sociocultural factors. For example, Cuba is one of the few countries where the suicide rate in adolescent females is greater than for males (32). With the majority of Hispanics in Miami-Dade County being of Cuban descent, our finding that antidepressants at autopsy were more frequent in women rather than males stimulates a variety of questions which cannot be currently answered. Future studies may use our results to examine these phenomena further.

Because antidepressants can be both a treatment for and a method of suicidal behavior, the relationship between antidepressant use and suicide is complex. Our retrospective chart review is therefore not without its limitations. This observational study can neither clearly establish nor refute a causal relationship. Although we are able to accurately report the presence of antidepressants on toxicological analysis, chart reviews are limited in their ability to elucidate specific factors that may have contributed to each death. Clarifying the question of causality would require randomized comparisons of antidepressants in a sample large enough to measure differences in this population. Because the incidence of suicide in this age group is relatively modest compared to the elderly age group, the need for such a large sample to detect a statistical difference makes it unlikely such a study will be performed. Therefore, large observational and retrospective studies remain valuable in providing useful data to understand the relationship between youth suicide and the use of antidepressants.

Future Directions

With respect to our two study questions, the data support the following conclusions: (i) consistent with previous literature, the presence of antidepressants at autopsy was rare in youth suicides in Miami-Dade County, Florida, from 1990 to 2007, and (ii) the presence of antidepressants in Hispanic youth suicide victims was similar to non-Hispanics. To better comprehend the factors associated with suicide among Hispanic youth in the United States, we need to start by understanding specific cultural characteristics that may play a role. These characteristics need to be studied in a systematic manner, utilizing psychometrically sound instruments. The interaction between individual and sociocultural factors also needs to be closely examined. A review of the literature did not reveal any studies examining the presence of antidepressants at autopsy in youth suicide victims in Latin American countries. Future studies should also compare the rates of antidepressants at autopsy for Hispanic-American suicide victims to that of their countries of origin. All these information could help us better understand this complex, multidetermined problem. As we come to better recognize the diverse factors that play a role in youth suicide, more effective interventions can be developed to eliminate one of the major causes of preventable death.

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