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Review Article

Epidemiological Aspects of Suicide in Teenagers

Dalila Cuesta Revé*

Pediatrician, Nichupte Medical Clinic, Cuban Medical Center, Puerto Morelos, Qna Roo, Mexico

***Corresponding Author:** Dalila Cuesta Revé, Pediatrician, Nichupte Medical Clinic, Cuban Medical Center, Puerto Morelos, Qna Roo, Mexico.

Received: February 14, 2018; **Published:** March 26, 2018

Abstract

Suicide is a concern and relevant subject affecting the world's population, it constitutes a serious health problem that requires special attention, particulary in teenagers because of the increase in mortality from this cause in recent decades. Provide an overview of the suicidal behavior in the world, through the knowledge of the epidemiological aspects, the suicidal physiopathology, risk factors, the psychopathological profile of suicidal teenagers, as well as the most used methods to commit suicide, are the objectives of this review, in which there is evidence that suicide rates are variable in each country in response to multiple factors that are interrelated to each other, including genetic, family, biological, psychiatric, psychological, social, being higher in the European countries than in Latin America, with one incidence higher in men than in women. There is a genetic predisposition associated with suicidal behavior. Mental disorders are the most frequently as risk factors for suicide among teenagers and among them, the depression, which in turn is part of the psychopathological profile of the suicidal behavior in this age group, in addition to other personality features, such as impulsivity, aggression, and social isolation. The methods commonly used in reviewed countries are: the drug overdoses, hanging, the ingestion of pesticides and toxic and the use of firearms.

Keywords: *Suicide; Teenagers; Epidemiological Aspects; Suicide Behavior; Risk Factors; Mortality*

Introduction

Suicide is a complex problem in which psychological, social, biological, cultural and environmental factors are involved, constituting the second cause of death in the group of 10 to 24 years. It is estimated that at the global level suicide accounted for 1.8% of the global burden of morbidity in 1998, and that in 2020 it will represent 2.4% in the countries with market economy and in the former socialist countries [1].

We are faced with a phenomenon that far from diminishing, has increased today by leaps and bounds, directly affecting adolescents, a population considered apparently healthy, but totally exposed to risk factors that determine the emergence of serious health problems as is the case of suicide that goes beyond a symptom of a mental pathology and not only affects the adolescent who commits it; both the causes and the act itself involve the whole environment. Adolescents are a vulnerable age group because of their characteristics, which predominates the search for identity, acceptance and independence, the importance of body image and the adoption of new ways of life, where social relations play a role determinant. In this search they go through dangerous ways in which they face risky situations that if they are not managed properly, with some or some support networks, they can become factors that are conducive to suicidal behavior. Suicidal behaviors are responsible for 15% of the 15000 deaths from injuries occurring daily in the world. Mortality mainly affects males and increases rapidly with age from adolescence [2].

Although there are effective care standards to intervene in individuals at high risk of suicidal acts, there is little or no empirical information available. Dr. Edwin S. Shneidman (1959) founder of the modern Suicidiología, best known for his clinical theory and wisdom about suicidal patients and one of the first investigators of the thought process of suicidal individuals, which he called "logic of the suicide", opted for an approach considered strategic and increased to persuade, convince, invite, ask and influence the patient to reconsider suicide [3].

This review aims to know the main epidemiological aspects of suicide in adolescents, its pathophysiology, the psychopathological profile of suicidal adolescents and risk factors, as well as the methods most used by teenagers to commit suicide.

Epidemiology of suicide in teenagers

Suicide is a serious public health problem. According to the World Health Organization (WHO), about 800 000 people annually take their lives, which is approximately a suicide every 40 seconds. Each suicide is a tragedy that affects families, communities and countries and has lasting effects for the relatives of the suicidal. Suicide can occur at any age, and in 2015 was the second leading cause of death in the age group from 15 to 29 years around the world. Suicide not only occurs in high-income countries, but is a global phenomenon that affects all regions of the world. In fact, in 2015, more than 75% of suicides worldwide took place in low-and middle-income countries [4].

The Pan American Health Organization, in its regional report on suicide mortality in the Americas 2014, describes that historically Latin America has had suicide rates below the world average, while North America is located in a Mid-tier (World Health Organization, 2013). Mortality data in Latin America have been described as "irregular", especially when compared with data from European countries (Bertolote and Fleishman, 2002). The delay in the data reporting is one of the problems. In the region, there are also marked disparities in suicide rates among different countries, even among some with similar levels of development (Liu, 2009). Another problem is related to the initial notification of suicides and possible erroneous classifications. The validity of the cases denounced may be influenced by cultural and religious factors, as well as by the stigmatization of those who commit this act (Wasserman, 2005). With around 65,000 deaths per year for suicide and a adjusted mortality rate of 7.3 per 100,000 inhabitants in the period 2005-2009, suicide constitutes an extremely important public health problem in the Americas. From a subregional perspective, the non-Hispanic Caribbean (Anguilla, Antigua and Barbuda, Netherlands Antilles, Aruba, Bahamas, Barbados, Belize, Bermuda, Dominica, Guadeloupe, Grenada, French Guiana, Guyana, Haiti, Cayman Islands, Turks and Caicos, British Virgin Islands, Jamaica, Montserrat, Saint Kitts and Nevis, St. Vincent and the Grenadines, St. Lucia, Suriname and Trinidad and Tobago) and North America (Canada, United States, United States Virgin Islands and Puerto Rico) presented the highest rates in the period 2005-2009. The lowest rates were observed in the sub-regions of Central America, the Hispanic Caribbean and Mexico (Costa Rica, Cuba, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama and the Dominican Republic), and from South America (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela). However, a number of non-Hispanic Caribbean countries lack complete data, so rates should be interpreted cautiously. The rate adjusted according to the age corresponding to Latin America and the Caribbean was 5.2 per 100,000 inhabitants for both sexes. By subregions, annual suicide rates of 100,000 inhabitants, together for both sexes, adjusted according to age, were: North America, 10.1; Central America, Hispanic Caribbean and Mexico, 5.3; South America, 5.2; and non-Hispanic Caribbean, 7.4. The Pan American Health Organization reports that at the global level, men have a higher suicide rate than women, with an approximate ratio of 3.5 to 1. In contrast, women have greater suicidal attempts than men. One of the reasons that explain this scenario is that men use more violent and lethal methods [5].

These data coincide with those of the World Health Organization Peru that say that suicide in almost everyone is greater in males than in women with a cumulative proportion of 3 to 5 males for a woman who does; what is greater in women is the suicidal thought and intent, in its different stages of the life cycle, but the man is the one who gets to consummate it in greater number [6].

In an analysis of the death record of children in Queensland between 2004 and 2012, 149 suicides were recorded: 34 of children aged 10 to 14 years and 115 of adolescents of 15-17 years of age. Gender asymmetry was less evident in suicides of children and suicides were significantly more frequent in indigenous children. Children residing in remote areas were significantly more likely to die from suicide than other external causes, compared to children in metropolitan áreas [7].

According to INEGI data, in Mexico the suicide rate among the population from 15 to 29 years has remained elevated. Considering the suicides that occurred and registered in 2014, 2 493 of young people aged 15 to 29 years (40.2% of the total), observing a rate of 7.9 suicides per 100,000 young people of this age group. By sex, suicide rates among this population group are 12.5 in males and 3.5 in females (per 100,000).

The suicide rate in young people aged 15 to 29 years by residence, is higher in Aguascalientes, Campeche and Chihuahua, (16.3, 14.5 and 14.0 for each 100,000 inhabitants, respectively). While Oaxaca (4.4), Morelos (4.3) and Guerrero (3.4), present the lowest rate [8].

Suicide in Cuba is the ninth cause of death in the general mortality chart; it occupies the third cause of death in the group of 10 - 19 years and 4th place in the groups of 5 - 14 years and 15 - 49 years, increasing rates from those over 60 years, in the three-year age of 2008 - 2010; it is prevalent in men with rates of 4.5 with respect to women with rates of 1.1 [9].

In 2015, 2,068 suicides were presented in Colombia, 10% more than in the previous year, and 48.74% of them were presented in the age group from 15 to 34 years. In the age range of 10 to 14 years, the rate for 100,000 inhabitants was 1.73, and in the 15 to 17 years, 5.72 by 100,000 inhabitants [10].

Aguilar Gaxiola and collaborators, in the book "Epidemiology of Mental Disorders in Latin America and the Caribbean", states that Uruguay belongs to the group of countries with higher indicators in terms of suicide and Peru has the lowest suicide rates of America Latina [11].

Physiopathological aspects of suicide

Suicide is the result of the interaction between biological, developmental and social factors, and there are studies that indicate that individuals who die from suicide have a certain predisposition. On the other hand, recent evidence suggests that alterations in the DNA methylation can play an important role in the neurobiological processes that lead to suicide. The results of a study, in which samples from the cerebral left hemisphere were obtained in patients who completed suicide and patients who had sudden death, to examine DNA methylation patterns, showed a general rescheduling of these patterns in the hippocampus of the patients who completed the suicide, which could help explain alterations of the genetic expression associated with suicide and the possibility of behavioural changes increasing the risk of suicide [12].

Clyden and collaborators conducted a systematic review and meta-analysis of all published studies investigating the association between genetic polymorphisms and suicidal behavior, before August 2011. Although suicidal behavior can be a complex phenomenon that results from the interaction of several genes, proteins, metabolites, environmental factors and psychiatric disorders, this work has helped to identify important genetic variants in the hope of finding those that have a true association with suicidal behavior. The results showed that there are significant associations between polymorphisms in SLC6A4 and TPH genes and suicide attempts [13].

Aitor Castillo reveals in a review on the pathophysiology of suicide, that the first investigations on the neurobiological aspects of suicide, have been carried out through studies of the serotonin system. Some evidence shows that the levels of the main metabolite of serotonin are diminished in the cerebrospinal fluid. Also some researchers have identified polymorphisms in the gene of tryptophan-hydroxylase, associated with suicidality. Similarly, other researchers studied 211 adolescents and related levels of serotonin in plasma with psychometric measures, concluded that the determination of the plasma concentration of serotonin in combination with some measures psychometric, can serve as a safe and economical marker of psychopathology and could help to distinguish subgroups of suicidal teenagers [14].

Risk factors for suicide

The literature about suicide indicates that there are some risk factors associated with this problem and that have been studied widely in adolescents.

Cuenca Edeltes and Col., in an epidemiological clinical study on the suicidal behavior in adolescents in the province of Holguín, Cuba, concluded that middle and late adolescence constitute risk factors, aggravated by depressive disorders, lack of a project of creative life in dysfunctional families with the presence of disorders or problems related to mental health (alcoholism, psychiatric disorders, family violence and attempted suicide) [15].

An investigation carried out in children and adolescents between 8 and 17 years old with suicidal intent, in a Hospital in Córdoba, Argentina, during the period 2006-2007, showed that 100% of them presented psychopathological antecedents as risk factors, being the most prevalent the behavioral disorders, previous suicide attempts (69.23% of those who presented them were not in treatment), addictions (the most frequent, the consumption of alcohol and marijuana) and learning disorders. Other antecedents detected were: intrafamilial violence, mood disorders (depression and bipolar disorder), sexual abuse, eating disorders and psychosis [16].

Based on the scientific articles published in international databases, it was found that the prevalence of suicidal behaviors in the patient with epilepsy is diverse, but certainly greater than in the general population. Among the medical risk factors, antiepileptic drugs and the type of epilepsy have been widely identified as predictors of these behaviors. Psychological risk factors include psychiatric records, especially comorbidity with anxiety, depression, and a history of suicide. In contrast, sociocultural risk factors are scarce and their association with suicidal behavior is still controversial [17].

According to the specialists, the factors that determine a suicide attempt are multiple and varied but generalizing, it can be said that mental disorders (depression) and disproportionate use of alcohol especially, are a major factor of risk in Europe and the US, while in Asian countries the impulse plays an essential role [18].

Canadian Medical Association Journal published a study by Swanson and Colman in 2013 in adolescents aged 12 to 17 that showed that the exposure to suicide in classmates and to a personally known suicide, predicted later suicidal tendencies, at least 2 years following the event. The authors mention that a theory suggests that suicide can be "contagious" (exposure to suicide can influence an individual to attempt suicide) supported by ecological studies [19].

According to Dr. Matilde Madaleno and PAHO collaborators, the depressive symptoms and suicidal behaviors are the most common in mental health concerns between 11 and 33% of young people in the Latin American and Caribbean región, Canadá, Cuba, El Salvador, Trinidad and Tobago, USA, Uruguay and Venezuela have suicide rates in males 15 to 24 years of age exceeding 10 per 100,000 inhabitants. In a survey of adolescents in school in nine countries in the Caribbean, 12% of respondents had attempted suicide and 50% had depression symptoms [20].

According to the report prepared by the World Health Organization, Geneva, 2014 and entitled "Health for the world's adolescents", depression is the leading cause of illness and disability among adolescents of both sexes aged between 10 and age 19 [21].

In a study conducted in the state of Sonora involving 1358 students of both sexes from 15 to 19 years, depression appeared in 67.3% of those who had tried to commit suicide and in 81.1% of those who expressed suicidal ideas with a tendency to be greater in women [22].

According to the World Health Organization's press release in 2014, the three leading causes of death among adolescents worldwide are injuries caused by transit, HIV/AIDS and suicide [21].

A review article published by Wendt and Lisbon in 2013 on cyberbullying, describes cyber bullying as a specific, unique and unprecedented category of violence, can be broader than the bullying phenomenon that occurs at any time and without confined and limited physical space. Studies show that victims of cyber-bullying may be more likely to attempt suicide.

On the other hand, research shows that people involved in this phenomenon are at increased risk of substance abuse and the onset of anxiety and depression symptoms compared to those who did not experience this form of aggression peers [23].

Picazo Zappino pointed in another review article that school failure constitutes a risk factor for suicidal behavior in adolescents, when is associated with strong academic pressure, personal dissatisfaction with the results obtained and an insufficient social support network (mostly family) [24].

In the study carried out by Espinosa and collaborators in university adolescents in Colima, researchers found that sexual abuse showed the greatest degree of association with suicidal behavior, followed by verbal violence, drug abuse, physical violence and smoking, coinciding with the reported by authors who have found a strong association between sexual abuse in childhood and suicidal ideation, while others have described a strong relationship between school violence, discrimination and physical aggression with the development of low self-esteem and suicidal behavior. "The violent treatment of adolescents, particularly those directed against women, seems to be much more common than thought and to be a major cause of emotional upheaval in large sections of the population." In this study it is also noted that in Guanajuato, Mexico was found association between child suicide and family violence in a retrospective investigation conducted in Guanajuato [25].

A study carried out in Cuba in the municipality Morón, Ciego de Ávila in adolescents between 11 and 18 years with suicidal intent, detected as associated risk factors, the existence of difficulty in communicating with their parents, divorce and physical and verbal aggression, the school rejection, sadness, boredom and a history of friendships they had tried against their lives, which evidences the association between the attempted suicide and a dysfunctional family structure and dynamic [26].

In an investigation to determine the suicidal risk and its associated factors in high school students from three schools in Manizales, Colombia, a level of suicidal risk was found superior to that of other similar populations, the depression and the family dysfunctions as associated factors. A very important finding was that peer harassment greatly increases suicidal risk [27].

Psychopathological profile of the suicidal teenagers

Núñez Gómez and collaborators carried out a bibliographical review that allowed them to recognize that the concept "profile of the people who have committed suicide attempt", over time, presents different connotations, including epidemiological, psychopathological, sociological, family, cultural and deficit studies related to clinical and health psychology. As far as the psychopathological profile is concerned, it is described that these people show depressive symptoms associated with the consumption of alcohol, psychoactive substances and disagreement with sexual orientation. Other authors report the presence of mental illness, expressed in isolation, sexual disturbance, emotional repression, denial and aggression. Some point out that these people present a sense of hopelessness and guilt, major depression, hostility, impulsiveness, and a history of suicidal intent. Everyone agrees that the emotional sphere is affected and is accompanied by the consumption of psychoactive substances [28].

Among the personality traits of suicidal teenagers, impulsiveness, difficulty in managing aggression and social isolation have been found. Studying the relationship between personality and suicidality in adolescents, Heather, Paris and Tureckis formed three constellations in the personality of the suicidal teenager that correlate with the suicidality. The first one is characterized by aggression and impulsiveness combined with a hypersensitivity to minor life events; the second, by narcissism and perfectionism and inability to tolerate the slightest failure with an underlying schizoid personality structure and the third by hopelessness with an underlying depression [29].

"The psychopathology of suicidal behavior is characterized by severe acute depression with feelings of devaluation, helplessness, hopelessness, guilt, anger, impotence and intense distress, whose evolution is accompanied by suicidal ideas and collection of means to self-harm, in a disorganized and chaotic family environment with no social network support. It is also worth noting the presence of masked depression, which can be manifested by patterns of behavior characterized by intense activity and a superficial or non-authentic joy, which can give the false impression that there is no problem. Some guidelines warn of possible suicide, but as long as potential suicides give signs of their intentions and perceive a certain social presence of their relatives, their attempts will be more diffuse but not less lethal" [30].

In an investigation on the personal profile of adolescents with suicidal ideation in Spain, the authors made an approximation to the psychological description finding that they present tendency to the introvert and show difficulties when expressing feelings and make friends, because they don't trust the friendship of others. At the same time, they are vulnerable and emotionally labile when they find themselves in difficult situations, sometimes reaching situations of denial of pleasure and intensifying negative aspects of their lives. In line with the concerns they express, they feel insecure with themselves, discouraged, confused with their identity and do not like. They have suffered violent situations, abuse and/or stress in the family, and/or lack of communication and affection, a circumstance that has led them to the non-acceptance of their being and the environment. They are young people who consume alcohol, drugs, or smoke in excess. They also show impulsiveness/tension and are undecided. Depressed humour is present and they think of death itself or to injure themselves as a way out of their situations of pain [31].

Suicide methods

The most commonly used method of suicide varies depending on the culture and access it has to them. In Brazil, the main means used are hanging (47%), poisoning (14%) and firearms (19%), in England and Australia dominate hanging and gas poisoning; firearms in United State and pesticide poisoning in China and Sri Lanka. Pesticides used in suicide cases are in particular, organophosphorus, widely used in some countries, such as China, Sri Lanka and India, and prohibit use in more industrialized countries [32].

The method used for an attempted suicide is the determinant factor of the outcome. A nationwide investigation of suicide attempts and suicidal behavior traits, conducted in Korea, showed that suicide methods used by individuals with attempted suicide are diferent tan those used by individuals who completed the act. Of suicide methods, drug poisoning and cut-off were the most common, pesticide poisoning was related to a previous history of suicide attempts, with age and residential area. The hanging and high jumps resulted in a higher percentage of deaths [33].

In a retrospective study of patients under 18 who visited an emergency unit in Barcelona after a suicide attempt during 2008 and 2012, a total of 241 patients were included, of which 203 were women and the average age of patients was 15.6 years. The most frequent suicide mechanism was drug overdose (94.2%) [34].

Michelle New and collaborators reported that the risk of suicide increases dramatically when children and teenagers have access to firearms at home, and nearly 60% of all suicides in the United States are committed to a weapon. A very common method is the drug ingestion [35].

According to a World Health Organization in 2008 about suicide methods, in an international comparison from the mortality database, it was observed that pesticide poisoning was common in many Asian countries and Latin America, while drug poisoning was common in the Nordic countries and in the United Kingdom. The hanging was the preferred suicide method in Eastern Europe, as did firearms in the United States and the leap into the void in cities and urban societies such as the Special Administrative Region of Hong Kong China [36].

In a research conducted in Brazil on the characterization of suicide in teenagers and nursing care, the intake of drugs and poisons was identified as the method of choice for the suicide attempt among teenagers [37].

Conclusions

1. Suicide rates are variable in each country in response to multiple interrelated factors, including genetic, family, biological, psychiatric, psychological, social, are higher in the European countries than in Latin America, with a greater incidence in males than in women.
2. There is a genetic predisposition associated with suicidal behavior.

3. The risk factors of suicide in adolescents are numerous and diverse, occupying the first place mental disorders and within them, depression.
4. Impulsiveness, aggression, social isolation and mainly depressive symptoms, are some characteristics of the personality that are part of the psychopathological profile of teens suicidal, demonstrating a clear impact on the emotional esphere.
5. The methods most commonly used to commit suicide are: drug overdose, hanging, pesticide and toxic ingestion, and use of firearms.

Conflicts of Interest

No conflicts of interest.

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Volume 7 Issue 4 April 2018
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