

Addiction and Suicide Substance use Disorders and Risk for Suicide: A Systematic Review



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Abstract

Introduction: Suicide deaths especially among adolescents are very common in the clinical industry [1]. Alcoholism and substance use disorders frequently occur along side common psychiatric disorders and are associated with suicide deaths. Previous studies show that roughly sixty-three percent of people who committed suicide suffered from substance use disorders, especially alcoholism [2]. Several scientific studies found that individuals who suffer from substance use disorders and mainly alcoholism have a higher risk of suicide thoughts, suicide behaviors and suicide death. Currently, a number of risk factors for suicide have been recognized in alcoholism. However, there are a lot of inconsistencies in the results obtained from those studies. Again, there are still a lot of questions to be answered regarding the exact connection between substance use disorders and suicide. There are still rooms for more scientific research to be conducted about the relationship of substance use disorder. To examine the actual effects of alcoholism and substance use disorder on individuals with suicide ideation, attempted suicide or suicide death. Thus, a systematic review of available studies is necessary.

Objectives: Based on the already existing literature, the aims of this systematic review are:

- To provide up-to-date information about the link between alcohol use and suicidal behavior both on individual level and at group level.
- To determine the risk factors for suicide in alcoholism or alcohol use disorder (AUD)
- To determine the relationship between substance use disorder (SUD) and suicide behaviors.
- To determine the risk factor for suicide from the use of other drugs or substance apart from alcohol.
- To determine the relationship between substance use and mental disorders together with the risk of psychiatric illnesses by the use of substances.
- To gather, tabulate and chart all studies that reported suicide death by the use of substances

The search criteria and Search Methods: We searched available literature for relevant studies that showed the relationship between suicide and alcoholism or substance abuse and included the recent 2017 scientific studies. We included studies both distinct studies and interconnected studies that investigated the connection between AUD, SUD and suicide and those that determined the relationship between substance abuse and psychological disorder. Although we performed general Google search, we as well searched through specific database including bibliographic databases, journals, PubMed, Scopus, and Web of Science. We included studies conducted as far as 2017. We also scanned through the reference lists of all included studies and manually examined them and chose studies that met the criteria for inclusion on the topic under review.

Search terms: The search term we used is suicide and substance abuse, alcoholism and suicide or suicidal behavior. Alcohol use disorder (AUD) and substance abuse disorder (SUD) SUD and psychological comorbidity. We also included the following search terms: suicide, suicide attempt, suicide ideation, suicidal behavior and rates or occurrence or prevalence vs relationship or link or connection with alcohol/drug abuse or substance use disorder, substance use disorder and psychological comorbidity.

Results: Alcohol use disorder has a direct link with suicidal death, suicide attempts, and suicidal ideation. Thus, alcoholism is a risk factor for suicide behaviors and suicide death. However, the rate of the relationship differs on the individual level among men and women and on the community or group level across cultures of differing drinking pattern. Therefore, gender and cultural difference commonly affects drinking patterns. There are significant association between AUD and suicidal ideation. Also, substance use disorder is a risk factor for suicide. Again, substance use co-exists with mental disorders although they don't always result to psychological disorder.

Conclusion: AUD: Previous scientific studies like [3] show that alcohol consumption results to suicide death but the degree of the relationship is directly proportional to the rate of drinking culture in an area. SUD Vs psychological comorbidity: A review of literature found; A strong relationship between suicide and substance abuse disorder [2]. Individuals who suffered from substance abuse disorder that committed or attempted suicide have comorbid psychological illnesses like mood disorders, loneliness, and depression; and commonly suffered from stress, relationship issues and/or poor social support. Available scientific evidence sufficiently showed that AUD extensively boost the risk of suicidal ideation, suicide attempt, and suicide death. Thus, suicide can be taken as a significant **outcrop of AUD. Practical evidence about the link is still very much required.**

Keywords: Alcohol use disorders; Epidemiological studies; Substance use disorders; Suicide; Alcohol; Suicidal behavior; Review; Suicide attempt; Completed suicide; Suicide ideation; Individual level; Group/community level; Drinking pattern; Comorbidity

Introduction

Information obtained from the World Health Organization database revealed that suicide follows car accidents and cancer as the third principal cause of death among people of fifteen to twenty four years of age. Also, suicide is the major cause of kid and teen referral to emergency psychiatric services [4]. Suicide is also rated among the top twenty major global causes of death among individuals of all ages [5]. Suicide is as well rated as the third major causes of death for individuals between fifteen to forty-four years old. It is also rated as the second major cause of death among individuals who are between ten to twenty-four years old [6]. Attempted suicide cases are twenty times more rampant than suicide death [6].

Suicide is the greatest cause of untimely [7]. Suicide ideation and death are caused by a lot of factors including emotional, social, genetic, cultural, and environmental factors [6,8,9]. Alcoholism and substance use disorder contribute greatly to suicide thought and death [5,10]. Alcoholism is a global issue that comes with a lot of severe personal and social costs. AUD leads to the development of chronic diseases as well as other issues like aggressive behaviors, suicides, and road accidents caused by influence of alcohol [5].

A lot of scientific studies found that there are great relationship between alcohol use disorder (AUD) and suicidal thoughts or behaviors but these studies have not been able to establish a collective approximation of the link between them [11] and Fazel et al. in 2008 [12]. The studies were limited also to specific populations. Thus, the results cannot be applied to the general population. Again, the study did not investigate the link between AUD and suicidal thoughts and suicide attempts. Up to date review on the available literature show that AUD boosts the risk of suicide, even though there are a lot of inconsistency among the results obtained. Consequently, a systematic Review of the link between AUD and suicide is required. Also, cross-sectional and expository scientific studies reveal that there are links between substance abuse and suicidal ideation, suicidal attempt and completed suicide. Goldsmith et al. accounted for an express increase of drug abuse since 1960 among American teen. Within the same period, suicidal behavior among teens also increased three times more. Thus, substance use among teens has been projected as a risk factor for suicidal acts.

Materials and Methods

We searched the literature and included various forms of studies including Meta analysis, case studies, individual based studies, community/group based studies and cross-sectional studies that address the link between AUD, SUD and suicide together with studies that investigated the link between substance use and psychological comorbidity. We included all studies with individuals of different age, gender, language, nationality, race, religion, or publication status in so far as they met the criteria. We used both studies presented as a full article or just as an abstract.

We also included studies that showed the association between AUD and suicide among drug abusers or among individuals suffering from mental disorders. AUD is a condition characterized by the detrimental consequences of recurring alcohol utilization and physiological dependence on alcohol which causes harm to physical and mental health and impairs social and work-related activities [13]. A suicidal ideation is any suicide related thought while suicide attempt is any action taken by the individual with the aim of causing one's death but which failed to result to death. A completed suicide is a death caused by self inflicted harm or injury. We excluded studies that recorded death caused by drug overdose but which are without suicide intent.

Data Collection and Analysis

In order to provide an updated and appropriate systematic review of substance abuse and suicidal behavior, we searched relevant literature up to those published in 2017. We screened the title and abstract of the retrieved studies that met inclusion criteria. We included articles from peer-reviewed journals. If a study title or abstract appeared eligible for inclusion in our study, we obtained the full article to ascertain if it met the inclusion criteria. We included studies that clearly specified the link between substance use and suicidal behavior in clinical and non-clinical health studies. We excluded articles with or without abstracts that did not clearly mention suicide ideation, suicide thought, suicide death, substance use, substance abuse and dependence or alcohol abuse and dependent and studies not published in English together with all articles that are not very relevant to the research theme.

Risk Factors for Suicide in Alcoholism

A lot of available scientific evidence based on epidemiological reveal that AUD has a link to an increased risk of suicide, but there are serious incongruities across these studies. In spite of these differences across studies and the limitations of available studies which includes: Limiting the studies to specific populations- The high-income countries without sufficient evidence from low and medium income countries [14].

Non investigation of the link between AUD and suicidal ideation and suicide attempt; the result of a meta-analysis carried out to determine the link between AUD, suicide and suicidal ideation, suicide attempt, conducted distinctly [5] effectively investigated the link between AUD and suicide. The Meta analysis made use of a broad search procedure and search criteria to boost the credibility of the search result and included as many studies as possible and different forms of observational studies no matter the age, country, and race and publication date. With the diversity of the evidence gathered, the researchers concluded that AUD has some form of association with suicide. The review concluded with the evidence at hand that AUD increases the risk of suicide and that additional research is not possibly going to alter the concluded projected effect of AUD on suicide.

The result of the review suggests that alcohol cessation programs will help to minimize the rate at which people use alcohol. Nevertheless, there is still not enough available evidence to show the dosage of alcohol intake that may lead to suicidal behaviors and suicide risks. Additional research is therefore required to determine the actual dosage of alcohol that will predispose one to suicidal risks [5]. The association between alcohol and suicide has been studied extensively. Extensive literature evidence demonstrates an association between alcohol use and suicidal behavior, both at the individual level and population level [15]. There are two phases of alcohol use among individuals with AUD: alcohol abuse and severe alcohol intoxication [16].

These two uses of alcohol differ greatly among individuals of different sexes across different countries and places with differing drinking cultures [17]. The studies of individual level and group level of alcohol use and association to suicidal acts are differing disciplines that requires different theoretical explanation. They also represent two sections of literature that are not often combined. Thus, a good number of studies that investigated the relationship between AUD and suicide, both in experimental and theoretical sagacity is associated to medical disciplines especially psychiatry, psychology, and epidemiology. There are, truly, good numbers of individual level studies of alcohol and link to suicidal behavior and a number of them like [18] included as well group level studies. However, there are limited scientific population level studies. There are also limited combined review article on addiction at the individual level and population level. This systematic study has bridged this gap. It estimated the approximate rate and variation of the link between alcohol consumption and suicidal behavior, both at the individual and the group level, among men and women and a combined review of estimation obtained from the two different levels. A number of studies as well show that the rate of association of alcohol and suicide varies from one alcoholic beverage to the other. Thus, some alcohol would more easily result to suicide than others. Examples of this alcoholic beverage are:

Spirits

Sample researches that illustrate this include the following [19,20]:

Beer

Example is a research conducted in Norway [14]. The most evident explanation for the difference is the fact that spirits sometimes beer is mostly the preferred alcoholic beverage for individuals with AUD.

a. Individual level studies: Individual level studies were to some extent reviewed with regards to the possible cause of suicide. The result showed that alcoholism is a risk factor to suicide and alcoholism reduction resulted to less BAC-positive suicide death among both genders [21]. Although

result showed that alcohol use at the individual level may lead to suicide death, and serve as a risk factor to suicide, it does not necessarily mean that the increased rate of among individuals who indulge in alcoholism would invariable result to suicide death. However, it may result to comorbid factors like depression. It may thus, be concluded that a review on the individual level showed that alcoholism is a risk factor to suicide and is a frequent cause of suicide [3,22]. Also, risk of suicide is more in alcohol addicts [23].

b. At the population level: There is a broad population or group level studies that showed that showed there are connections between per capita alcoholism and suicide. Alcohol intoxication and AUD are both connected to suicide death [24]. An increase in the numbers of individuals who drink alcohol results to a corresponding increase in the numbers of individuals who suffer from alcohol use disorder. This also results to an increase in the number of individuals who suffer from recurring incidents of alcohol intoxication amongst male than female. This implies that alcohol intake has a stronger correlation to suicide death in male than in female. Thus, estimated relationship between AUD and suicide are higher for men.

This implies that an increase in alcohol intake in men is commonly linked with a more comparative suicide rate increase in male than in female. Again, alcoholism and alcohol intoxication is more widespread in cultures or countries with extensive alcohol use which invariably affects the rate of suicide behavior in these areas. Thus, the rate of alcohol intake is proportional to the rate of suicide behavior. A lot of scientific studies have concluded that alcoholism is a major risk factor for suicide at the group or population level [25]. Available data show that there are fifteen to forty-seven percent rates of alcohol addiction among individuals with suicide behaviors [21].

Gender difference and drinking culture

In adult population studies, it was found that alcoholism and violent behavior occasioned by the influence of alcohol are more widespread among men than among women [26]. This by implication means that the rate of risk of suicide ideation, suicide attempt, and completed suicide are higher among a population of men than that of women. It also show related variations of alcohol behaviors and risk for suicide at the individual level. This also implies that there are greater link between risks to suicide behavior among men with AUD compared to women.

Nevertheless, since females appear more susceptible to adverse health issues from alcohol abuse than their male counterparts, the comparative risk of suicidal behavior may probably be more in female chronic alcohol users than that of male [26]. The differences in the projected link in connection to gender and drinking culture properly matches with the assumptions that alcohol is an underlying factor in suicidal behavior. However, there are still needs for investigational

appraisal of the fundamental relationship between AUD and suicidal behavior. Also, since the available studies are from people from high income countries, future studies with low and medium income countries are still required.

Overall, the available studies show that there are gender differences in AUD both at the individual and group level and which in turn affects the rate of a causal relationship. Although there are enormous theoretical evidences that show that alcohol is a risk factor to suicidal behavior, empirical studies found that alcohol abuse or alcohol intoxication is not the exclusive cause of suicide death and that factors like genetics, personality traits, and mental disorders also contribute to the link at the individual level [27].

Thus, not all cases of suicidal behavior in individuals who suffered from AUD are actually caused by alcohol. For example, alcohol abuse may have resulted to depression and loneliness which may have stopped before the suicidal behavior [27]. However, there are indications that alcohol abuse or alcohol intoxication may indirectly cause suicidal behavior in other family members like kids, husbands or wives [2]. Therefore, there are a lot of complications about the actual connection between alcoholism and suicidal behavior. A major discovery in alcohol epidemiology, thus, shows that a boost in an overall alcohol use in a country is directly proportional to the numbers of alcohol abusers and intoxication episodes [28]. In view of this system of measurement, it is as well expected that alcoholism and suicide is as well connected at the population level.

Risk Factor for suicide for other drugs (other substance without alcohol)

Substance use disorders (SUD) are one of the psychological disorder that co exist with suicide related behaviors. Psychological studies found that roughly nineteen to sixty-three percent rates are connected to SUD. The risk to suicide is high among individuals with SUD, as well as in individuals with SUD and co-morbid depression [2]. There are other series of studies that found a close connection between substance use disorders (SUD) and suicidal risk [29]. A case study found that cannabis abuse and dependence are closely connected attempted suicide [4].

The link between substance use and attempted suicide

Many scientific studies found that suicide attempts are widespread in teens SUD and that the majority of individuals who are receiving treatment for suicide suffered from substance use disorder. Vajda and Steinbeck [30] found after a review of a suicide attempt that thirty-five percent of suicide patients while twenty-seven percent of them suffered from SUD. Studies found that individuals who made suicide attempts are five to twenty percent more than individuals who committed suicide [31]. Available research studies also show that roughly five percent of adults make suicide attempts at the slightest one time in their life [32].

The link between substance use disorder and completed suicide

Suicide has a close link to substance use disorder. Thus, establishing the factors that affects the risk to suicide behavior is significant. Individuals who suffer from AUD or SUD and people who totally depend on them have the tendency of engaging in suicide attempt roughly six times more than individuals who have no drug or alcohol use tendencies. Scientific studies show a widespread relationship between substance use disorder and suicide behaviors among teens. However, future studies are required to determine the exact relationship between SUD and suicidal behaviors [4]. Shafii and colleagues in 1980 found that there was a spectacular boost in the numbers of children and teens that are referred for psychological studies. The psychological autopsies of kids and teens that suffered from suicide death between 1980 and 1983 show that 24 participants in the study suffered from substance use disorder [4].

Wines et al. found that twenty-eight percent of patients of substance use disorders suffered from suicidal ideation whereas twenty-one percent drug abuse patients had attempted suicide. Wines et al. as well found that after two years of substance use management, nineteen percent of the patients still suffered from suicide ideation while seven percent attempted suicide. Scientific studies also found that older people who suffer from SUD faces higher risks for suicide ideation, suicide attempt and suicide death than teens [33,34]. Also, individual who have attempted suicide in the past are more likely to attempt suicide in the future [35]. Emotional disorders and depression are common risk factor for suicidal behavior among substance users [32,33,36].

The most commonly abused substances in individuals who attempt suicide are heroin and sedatives. The connection between suicide and the use of other drugs is less [37]. The degree of completed suicide among men with substance use disorder is two to three times more than men who do not make use of drugs. On the other hand, the use of substances in women boosts the risk of suicide by 6.5 to 9 percent in females who don't make use of drugs [36,38]. The majority of drug users who attempted suicide do so by overdosing themselves or through the use of drugs and capsules. However, for a few drug users, their suicide attempt has not direct connection to their drug use [39]. Despite the fact that there is an association between the SUD, a good number of drug users are never involved in suicide attempt. It is thus, significant to discover people who suffer from substance use abuse which may be predisposed to greater suicide risks [2,37].

Risk factors for suicide attempts

Scientific evidences show that the key risk factors for suicide attempts among individuals with the substance abuse disorder are:

- a) Hereditary factors

- b) Psychiatric disorders
- c) Excessive drug use and dependence
- d) History of suicide behavior in the family,
- e) The length of time the individual has abused the substance
- f) The use of intravenous heroin

How hypertensive the individual's structure is?

When these are put together, we can rightfully wrap up that suicide, ideation, suicide attempt and death by suicide can be caused by a combination of factors which include biological and psychological factors together with the effects of the substances used [40]. Children who suffer from the psychiatric disorder and who attempt or commit suicide have a history of psychiatric heredity. Scientific research found that psychiatric heredity is a major risk to suicidal attempts in situations where there is a history of psychotic disorders, use of substances and death by suicide. Apart from the standard inheritance trait which is basically correlated with psychotic disorder, behavioral patterns may as well play a major role. Also, the exemplary behavior that is transmitted from one member of the family to the other instead of the disorder itself may also be responsible for suicide behavior [41].

Risk of Psychiatric illness by the use of substances

Psychiatric illnesses are the most frequently available and best investigated risk factor linked with suicidal ideations, suicide attempts and suicide death [42]. Individuals who suffer from SUD commonly have psychological and behavioral issues that lead them to impulsive use of drugs and make them incapable of controlling their actions [43]. Roughly ninety percent of all individuals who commit suicide are diagnosed with one psychiatric illness or the other [44]. The most common psychiatric commodities found in individuals who suffered from substance use disorders are mood disorders like depression and bipolar disorders. Comorbid substance use and other psychiatric illnesses is an outstanding feature of patients of mental health services. Among a group of substance abuse teens who are receiving treatments, Diamond and colleagues discovered that seventy-two percent of them who make use of marijuana had at least two co-occurring psychological illness at the time they come for treatment. Clark et al. found in a case study that teenagers suffering from alcohol dependence have a history of widespread forms of psychopathology like conduct disorder, ADHD, severe depressive disorder and PTSD when compared to the teens that don't make use of substances.

Despite the fact that the impact of co-morbid psychological illnesses continue to be debated upon, it is clearly evident that individuals who suffer from AUD have at least one comorbid psychological illness. Scientific evidences show that individuals who suffer from alcohol abuse and those who suffer from alcohol dependence are likely to have fifty-seven to eighty-four percent

rate of occurrence of psychiatric comorbidity [45]. There are widespread occurrences of mood disorders and co-occurring alcohol dependence disorder. A number of individuals who suffer from substance-use disorders also suffer from severe depression at the same time [45]. Co-occurrence of mental disorder and substance use disorder in an individual heightens the individual's risk of suicidal behavior and the seriousness of the psychological illness, particularly mood disorders and disorderly behavior disorder.

Harrington et al. found that depression in childhood to a great extent determines if an individual will attempt suicide in his or her teenage years. Research also found that this risk is amplified when the individual is suffering from depression-related substance abuse, cognitive distortions, desperation and stumpy self-esteem, a submissive coping attitude, social maladjustment, interpersonal issues, family related stresses and also from environmental stressors [45]. Comorbidity means when an individual is suffering from two co-occurring disorders. The disorders may occur at the same time or end-to-end. Comorbidity is also used in cases where the existence of co-occurring disorders makes each of the co-existing conditions worst.

The relative link between Comorbid use of substances and Other Psychological Illnesses

Psychological illnesses commonly co-exist among individuals suffering from substance abuse and addiction. The association is well-built that a number of individuals believe that substance use results to the development of psychological illnesses. Although this is true for a number of cases, it is not always the case [46]. Scientific studies found that Individuals who use substances are two times more prone to mood and anxiety disorders than individuals who do not [47].

Research evidences found that AUD boosts psychological illnesses, hostility and suicide-related alcohol behaviors and makes it difficult for the individual to cope with management tactics. The extra difficulty may be so strong to move the individual to put the suicide thought into action. A number of patients who attempted suicide made use of excessive use of alcohol or are under the excessive influence of alcohol intoxication at the time they made the suicide attempt. Nevertheless, SUD may as well act as a more distal risk factor for suicide.

Hufford proposed a correlation between SUD and excessive stress and co-morbid psychopathology, which invariably boosts the risk of suicidal acts. Bukstein et al. [48] found that suicide are more likely to be found among individuals with severe issues of substances abuse and that these community of individuals are most likely going to be suffering from co-occurring major depression, suicidal ideation, history of depression and substance abuse in the family, legal issues and have toxic substances at home than individuals without the disorder.

According to Bridge, the co-occurrence of other risk factors

like existing drug intoxication, former suicide attempt or easy access to a toxic agent may boost an individual's risk of suicidal behavior. The danger of the comorbid psychopathology ought to be taken seriously. The presence of numerous co-occurring disorders is a major indication of pitiable upshot in individuals with SUDs. This boosts both the individual's risk for suicidal

acts and the brutality of the substance abuse. The rate of reappearance of substance use in addition to the presence of stressors in an individual's environment ought to be cautiously looked at by medical experts when treating individuals with co-occurring SUD and suicidal risk due to the fact that they can considerably affect the emotional health of the individual.

Tabulation of suicide deaths caused by substance use (Tables 1 & 2).

Table 1: A: Scientific evidence of Suicide death caused by alcohol use, Alcohol abuse, alcohol dependence, alcohol disorder and Alcohol intoxication.

B: Suicide Deaths related to drug misuse.

SN	Research Author	Substance Used	Study Year/Years	Suicidal behavior	Population of study
1	Murphy, (1990) [51]	Alcohol	1990	Suicide death	General population
2	Harris, (1997) [31]	Alcohol	1997	Suicide death	General Population
3	Harris, (1997) [31]	Alcohol	1997	Suicide death	Population of women
4	Harris, (1997) [31]	Alcohol	1997	Suicide death	Population of men
5	Berglund, (1998) [27]	Alcohol	1998	Suicide death	General Population
6	Birckmayer & Hamenway (1999)	Alcohol(Liquor)	1999	Suicide death	Teens 18 and 20 yrs
7	Escobedo and Ortiz, (2002)	Alcohol	2002	Suicide death	Population sample from New Mexico (US)
8	Markowitz et al., (2003)	Alcohol (beer)	2003	Suicide death	Children and teenagers 10 to 24 (US)
9	Espositosmythers, (2004)	Alcohol	2004	Suicide death	Teenagers
10	Pirkola, (2004)	Alcohol	2004	Suicide Death	General Population
11	Carpenter, (2004)	Alcohol	2004	Suicide death	Youths 15 to 29 Years
12	Wilcox et al., (2004)	Alcohol	2004	Suicide death	Population of men
13	Wilcox et al., (2004)	Alcohol	2004	Suicide death	Population of men
14	Vamik et al., 2006	Alcohol	2006	Suicide death	General population
15	Zalcman and Mann (2007)	Alcohol	2007	Suicide death	Alberta, Canada decedents
16	Giner, (2007)	Alcohol	2007	Suicide Death	Teenagers less than 20 years
17	Carpenter and Dobkin, (2009)	Alcohol	2009	Suicide death	US decedents 19 to 22 yrs
18	Pridemore & Snowden, (2009)	Alcohol	2009	Suicide death	Slovenia
19	Johnson et al., (2009)	Alcohol	2009	Suicide death	California (US) decedents
20	Schneider, (2009) [2]	Alcohol	2009	Suicide Death	General Population
21	Son & Topyan, (2011)	Alcohol	2011	Suicide death	US decedents states
22	Vijayakumar, (2011)	Alcohol	2011	Suicide death	General Population
23	Pompili, (2012) [4]	Alcohol	2012	Suicide death	Teens
24	Gucza et al., (2012)	Alcohol	2012	Suicide death	US Decedents
25	Sauliune et al., (2012)	Alcohol	2012	Suicide death	Lithuania decedents 15 to 64 years
26	Zupanc et al., (2013)	Alcohol	2013	Suicide death	Slovenia Decedents
27	Pridemore et al., (2013)	Alcohol	2013	Suicide death	Russia decedents
28	Berman (2014)	Alcohol	2014	Suicide death	Alaska native men in the rural communities between 15 and 34 years
29	Giesbrecht et al., (2014)	Alcohol	2014	Suicide death	14 states (US)

Table 2: Empirical Evidence of substance use disorder and connected suicide death.

SN	Research Author	Substance used	Research design	Year	Research population
1	Robins, Murphy, Wilkinson et al. (1959)	Substance use	Substance use Study involving suicide deaths	1959	USA Men and women
2	Barraclough, Bunch, Nelson et al. (1974)	substance use	Substance use Study involving suicide deaths	1974	UK
3	Beskow (1979)	Substance use	Study involving suicide deaths	1979	Swedish Men and women

4	Chynoworth, Tonge, Armstrong (1980)	substance use	Substance use Study involving suicide deaths	1980	Australian population
5	Rich, Young and Fowler (1986)	substances use	Substance use Study involving suicide deaths	1986	USA
6	Rich, Young and Fowler (1986)	substances use	Substance use Study involving suicide deaths	1986	USA
7	Brent, Perper, Goldstein et al (1988)	substances use	Study involving suicide deaths	1988	USA men and women less than or equal to 19 yrs
8	Runeson (1989)	substance use	Study involving suicide deaths	1989	Swedish men and men aged 15 to 29 years
9	Asgard (1991)	substance use	Study involving suicide deaths	1990	Swedish men and women
10	Marttunen, Aro, Henriksson et al., (1991)	substance use	Study involving suicide deaths	1991	Finland population 13 to 19 years
11	Cornwell, Olsen, Caine et al., (1991)	substances use	Study involving suicide deaths	1991	USA men and women less than or equal to 50 Years
12	Marzuk et al., 1992	Substance use	individual review of autopsy and toxicological records	1992	General autopsy review
13	Marttunen, Aro, Henriksson et al., (1993)	substance use	Study involving suicide deaths	1993	Finland population
14	Lesage, Boyer, Grunberg et al, (1994)	substance use	Study involving suicide deaths	1994	Canada men and women aged 18 to 35 years
15	Duberstein, Conwell, & Caine (1994)	Substance use	Substance use Study involving suicide deaths	1994	USA
16	Cheng (1995)	substance use	Substance use Study involving suicide deaths	1995	Taiwan population
17	Shaffer, Gould, Fisher et al., (1996)	Substance Abuse	Study involving suicide deaths	1996	USA men and women less than 20 years
18	Brent, Bridge, Johnson et al., (1996)	substance use	Study involving suicide deaths	1996	USA men and women between 13 to 20 yrs
19	Conwell, Duberstein Cox et al., (1996)	substance use	Substance use Study involving suicide deaths	1996	USA
20	Cheng, Mann, & Chan, (1997)	substance use	Substance use Study involving suicide deaths	1997	Taiwan
21	Shafii, Steltz-Lenarsky, Derrik et al., (1988)	substance use	Study involving suicide deaths	1988	USA population aged 11 to 19 years
22	Foster, Gillespie, McClelland et al., (1999)	substance use	Substance use Study involving suicide deaths	1999	UK population
23	Brent, Baugher, Bridge et al., (1999)	Substance use	Study involving suicide deaths	1999	US men and women 13 to 19 years
24	Appleby, Cooper, Amos et al., (1999)	substances use	Study involving suicide deaths	1999	UK men and women less than 35 years
25	Vijayakumar & Rajkumar (1999)	Substance use	Substance use Study involving suicide deaths	1999	Indian population
26	Harwood Hawton, Hope et al., (2001)	Substance use	Study involving suicide deaths	2001	UK men and women not above 60 yrs
27	Houston, Hawton, & Sheppard (2001)	Substance use	Study involving suicide deaths	2001	UK population 15 to 24 years
28	Roy (2001)	cocaine and alcohol use	a case control study	2001	cocaine dependent patients
29	Darke and Ross, (2002)	heroin and other drugs	Review article on suicide risks	2002	Heroin users

30	Roy (2002)	Psychological issues and opiate dependency	case control study involving suicide deaths	2002	opiate dependent patients
31	Waern, Runeson, Alleback et al. (2002)	Substances use	Study involving suicide deaths	2002	Sweden general population, less than or equal to 65
32	Cavanagh, Carson, Sharpe et al. (2003)	substance use	Study involving suicide deaths	2003	UK men and women
33	Conner, Beautrais & Conwell (2003)	substance abuse	Study involving suicide deaths	2003b	New Zealand
34	Schneider, Georgi, Weber et al. (2006)	substance use	Study involving suicide deaths	2006	German men and women
35	Kolves, Varnik, Tooding et al., (2007)	substance abuse	Substance use Study involving suicide deaths	2007	Eastern European countries
36	Havens et al., (2006)	Substance use and comorbid psychological disorder	Cross-sectional study involving suicide deaths	2006	injection drug users and noninjection drug users
37	Garlow et al., (2007)	cocaine or ethanol use	Retrospective analysis of records of completed suicide	2007	Cocaine users
38	Waldrop et al., (2007)	alcohol/drug use with comorbid psychological disorders	National cross sectional survey of teens involving suicide deaths	2007	Youths 12-17 years
39	Kalyoncu et al., 2007	Heroin and comorbid psychopathology	cross-sectional analysis of the socio-demography and clinical features involving suicide deaths	2007	Young adult heroin-dependent patients
40	Chabrol et al., 2008	Cannabis	Cross sectional study involving suicide deaths	2008	High school students
41	Innamorati et al., 2008	Alcohol, drug, and comorbid depression	cross sectional study involving suicide deaths	2008	young adults
42	Pedersen W (2008)	Cannabis	Longitudinal study involving suicide deaths	2008	2033 Young adult
43	Price et al., 2009	Cannabis and other substances	Longitudinal and cross involving suicide deaths sectional investigation	2009	Military men
44	Epstein and spirito (2010)	Smoking, alcohol, injecting drugs	Cross sectional study involving suicide deaths	2010	High school students

Conclusions, Future Directions, and Implications

Wide arrays of scientific studies show that there is a link between alcoholism and suicidal acts at both the group level and the individual level. Analysis on the individual level reveals that alcohol consumption usually precedes suicide and that rigorous alcoholism control results in a reduction of alcohol induced suicide death among individuals of opposite gender. There are a differing rate of correlation among gender and drinking culture. However, these dissimilarities do not contradict the fact that alcohol and drug use are risk factors to suicidal behavior. Nonetheless, empirical evaluation of a causative relationship between AUD and suicidal behavior is still necessary [14]. From what we have investigated so far, it is safe to conclude that AUD significantly boost suicidal ideation, suicide attempt, and suicide's death risk. Therefore, AUD can be considered a significant risk factor of suicide and one of the major causes of untimely death [5].

Future directions and implications

Comorbidity of SUD and emotional disorders is widespread that proper diagnoses and management is needed. Diagnosis and evaluation of these co-occurring disorders are taxing due to the great similarity in the symptoms of substance intoxication, drug abandonment, and mood disorders. Management strategies ought to be based on the diagnoses of risk factors of both suicide and substance abuse disorder. The treatment strategies ought to mix various curative measures like peer-to-peer tutoring, school-based programs, psychotherapy and the use of medicine.

Available pieces of evidence reveal that special suicide deterrence strategies can be developed which minimizes the risk of SUD, AUD and suicide among teens. Enhanced forensic psychiatric treatment for substance abuse and co-occurring psychological illnesses in addition to supervised self-restraint as a form of departure or liberation could be gainfully used to minimize and treat suicidal risk. This may perk up patient care by

dealing with his or her psychological health needs and boosting the prospect and opportunity of successful re-incorporation into the society and improved life outlook. This will also contribute to the public safety by minimizing the risk of reuse of the drug.

The management of substance use in patients with substance abuse disorder and comorbid mood disorders may minimize their hunger for substance use and boost their overall result. A systematic, theatrical test and evaluation can make the process of diagnoses of the differing symptoms of psychological disorders and signs of substance use disorder or substance intoxication and cure easy [49]. Although recently progress has been made to recognize particular treatment and curative options for people with SUDs who suffer from comorbid mood disorders, the situation of affairs in both the psychological health and addiction management systems make it difficult to provide the best care to patients [50,51].

The use of screening mechanisms to discover individuals who are likely suffering from mood disorders and providing a follow-up remedy after a period of substance use withdrawal may be especially handy for clinicians who have a lot of patients to attend to. There should as well be provision for immediate withdrawal supervision and possible remedy when risk is increased. This will assist forensic psychiatrists to find an equilibrium position between the care of the patient and the safety of the general public.

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