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Brief Review

ADOLESCENT SUBSTANCE ABUSE AND SUICIDE

Anju Dhawan, MD, Yatan Pal Singh Balhara, MD , Natasha, M Phil

Address for Correspondence: Yatan Pal Singh Balhara, Senior Resident, Department of Psychiatry, All India Institute of Medical Sciences, New Delhi, India- 110029. Email: **ypsbalhara@gmail.com**.

ABSTRACT

Adolescent substance abuse is a major public health concern. It is associated with an increased incidence of various psychiatric disorders like depressive disorders, anxiety disorders, attention deficit hyperactivity disorder, and conduct disorders and the relationship between mental and behavioral disorders and the substance use problems seems to be bi-directional. Adolescent suicide and substance abuse have a number of risk factors in common. Prevention of suicide requires an individualized comprehensive assessment and management plan aimed at substance use and psychiatric disorders. This would involve a multidisciplinary collaboration and use of pharmacological, psychological and social interventions.

Key Words: Adolescent, Substance abuse, Suicide

INTRODUCTION

Suicide is ending one's life intentionally. To be classified as suicide, an act of killing oneself must be deliberately initiated and performed by the person concerned in the full knowledge or expectation of its fatal outcome. It is estimated that deliberate self-harm (including suicide) causes nearly 1% of burden of diseases. It is the third leading cause of death among teens in America. The use of tobacco, alcohol and other drugs is a major contributing factor to accidents, violence and suicides among young people in many countries[1]. On the other hand, suicide is a major contributor to mortality due to substance abuse. Adolescent drug use is also associated with an increased risk for depression and suicidal behavior.

EPIDEMIOLOGY

In a 2001 Youth Risk Behavior Survey, the Center for Disease Control (CDC) reported that during the past year, 19% of high school students had ideation, 15% made a plan, 9% made an attempt, and 2.6% made a medically serious suicide attempt[2]. Suicide is among the leading causes of death among 10- to 19-year-olds in developed countries, and accounts for more deaths than all natural causes combined[2,3]. Completed suicide is uncommon in childhood and early adolescence but peaks during ages 15 to 19 years (rate of about 10 per 100,000 in United States of America)[2]. Since the early 1960s, suicide rates among 15- to 19-year-old males increased threefold but remained stable among females in that age group and among 10- to 14-year-olds. Increased substance abuse in the youth population has been proposed as one of the factors responsible for the rise in suicidal behavior among teenage boys. More girls than boys attempt suicide, however, five times more boys than girls die as a result, probably because boys are more likely to choose a lethal method[2].

It is felt that adolescent depression and substance use contribute to suicide. Over 90% of children and adolescents who commit suicide have a mental disorder before their death. Risk of

suicide as well as suicide attempts is increased by both legal and illicit substance use[4,5]. The association has been found with individual substances as well as use of multiple substances. The prevalence of substance use disorder among suicide victims aged 20 or less is high and has been reported to be in the range of 26%-62%. Between 40% and 60% of those who die by suicide are intoxicated at the time of death. An estimated 18%-66% of those who die by suicide have some alcohol in their blood at the time of death[6]. Lifetime risk of suicide for alcohol dependence was reported at 7% in a meta analysis[4]. Those with early onset of heavy drinking are more likely to indulge in suicidal behaviour. According to the Substance Abuse and Mental Health Services Administration (SAMHSA), youths who use illicit drugs other than marijuana are more likely to be at risk for suicide than are youths who do not use such drugs (29.4% vs 10.1%). Substance abuse is one factor that has been postulated to differentiate adolescents that have suicidal ideation from those who actually attempt it[6].

RISK FACTORS FOR SUICIDE IN ADOLESCENT SUBSTANCE USERS

Biological facors

Substance use and suicide attempts appear to be manifestations of impulsivity and impaired regulation of aggression. Specifically, alcohol dependence is associated with alterations in the serotonergic and noradrenergic systems[7]. Binding to the serotonin transporter is low in suicide completers who are alcohol dependent but not in alcohol dependent subjects who don't commit suicide. As compared to suicides completed by non alcohol dependent individuals, those carried out by dependent users of alcohol show evidence of less 5-HT1D terminal autoreceptor binding. It is hypothesized that up-regulation of ventral prefrontal 5-HT1A receptors in response to decreased serotonergic transmission may not occur in alcohol dependent suicide completers, leading to a failure to mitigate the impact of less serotonin upon signal transduction and thereby increasing the risk of suicidal behavior[7]. The decrease in alpha (1)- and alpha (2)-adrenergic binding is more pronounced in the alcohol dependent suicide group as compared to those without suicide completion although dependent on alcohol[7].

Psychiatric disorders

Pirkola et al assesed 106 adolescent (13-22 years) suicides in Finland retrospectively, using DSM-III-R and Michigan Alcoholism Screening Test (MAST)[8]. Forty-two percent of these victims were classified as having suffered either alcohol use disorder or diagnostically sub-threshold alcohol misuse. These victims were more likely to have co-morbid categorical DSM-III-R disorders, antisocial behaviour, disturbed family backgrounds, precipitating life-events as stressors and severe psychosocial impairment as compared to the control group. The performance of the suicidal act was associated with a higher tendency to be under intoxication due to alcohol.

In a study of 503 adolescents (188 female and 315 male, aged 12 to 19 years) diagnosed with an alcohol or substance use disorder, Kelly et al found that co-occurring mood disorders was associated with increased risk for attempting suicide[9]. Male suicide attempters had more symptoms of mood, alcohol, and disruptive behavior disorders and an earlier age of onset for alcohol use disorders and conduct disorders compared with males with these disorders who did not attempt suicide. Females with co-occurring conduct disorders and substance use disorders (other than cannabis use disorders) were at higher risk for attempting suicide than females who were not diagnosed with conduct disorders or non-cannabis substance use disorders. Also, female suicide attempters had more symptoms of substance use disorders (other than cannabis use disorders) and mood disorders compared with female non-attempters. Female suicide attempters

with mood disorders had an earlier age of onset of mood disorders compared with the age of onset for mood disorders among female non-attempters[9].

Depression: Depression is associated with a higher prevalence of substance use[10-12]. Adolescents with depression are also more likely to develop substance abuse problems at an earlier age[13]. Co-morbidity of substance use and depression is associated with an increase in the rate of suicide among adolescents[14]. In a study that made use of psychological autopsy for assessment, Shafi et al reported frequent use of alcohol and non-prescribed drugs by 70% of adolescents completing suicide as compared to 29% of control subjects[15]. In a longitudinal study of female high school students, the rate of suicide attempts in those using substances was 18.2% in those with depression as compared to the rate of 6.3% in those lacking the diagnosis of depression[10]. However, adolescent psychiatric inpatients, who abused substances, reported higher levels of depression than those who did not abuse substances, independent of whether or not they were hospitalized for attempting suicide[16].

Major depression with onset prior to substance dependence (heroin and/or alcohol dependence) predicts failure to remit from current episode and is a risk factor for relapse of substance dependence during periods of sustained abstinence. Periods of major depression during sustained abstinence are a risk factor for increased number of suicide attempts over the lifetime. Major depression with onset before the onset of substance dependence also predicts the severity of suicidal intent[17].

While, substance use may stem from an underlying syndrome of problem behavior among impulsive suicide attempters with predominant externalizing symptoms; non-impulsive suicide attempters with predominant internalizing symptoms may use substances to cope with negative affective states. Individuals using substance/ alcohol often perceive themselves as lacking control over their substance using behaviour; this leads to the self-deprecatory feelings. Release of the self-directed aggression under the influence of the substance could be responsible for the deliberate act of self harm by such adolescents.

Bipolar disorder: Substance abuse is present in most patients with bipolar disorder and associated with poor treatment outcome and increased risk of suicide. Increased impulsivity may be a connecting link between bipolar disorder and substance abuse. A study be Swann et al suggested that trait impulsivity is increased additively in bipolar disorder and substance abuse; and performance impulsivity is increased in the inter-episodic period in bipolar disorder if a history of substance abuse is present[18]. This increased predisposition to impulsivity when not manic may contribute to poor treatment compliance and outcome, and increased risk for suicide and aggression, in bipolar disorder with substance abuse[18].

Substance of abuse

Substance use (even short term use including the use of alcohol) has well documented effect on cognitive and thought processes and consequent behaviour. These effects range from immediate and probably reversible to long lasting and at least partially irreversible effects. Intoxication because of the use of the substance may serve as a proximal risk factor for suicidal behavior among distressed youths through its psychopharmacological effects on the brain by decreasing inhibitions, increasing aggressiveness and impairing judgment. Additionally, substance use such as alcohol increases the lethality of some medications, making it more likely that a suicide attempt via overdose will be lethal.

Substance use may also serve as a distal risk factor for suicidal behavior by increasing stress and exacerbating co-occurring psychopathology. It has been found that the number of

substances used by the adolescents adds to the risk of attempting suicide, whereas the type of substance is of little importance in predicting the chances of suicide attempt. The adolescents who attempt suicide are more likely to use substances on a regular basis and at an earlier age as compared to those who don't make such attempts[19]. Presence of past history of suicide attempt and current suicidal ideation has been found to be associated with an increased probability of attempting suicide in individuals using alcohol in a dependent pattern[20].

Psycholosocial factors

A history of a prior suicide attempt leads to a 30-fold increase in risk for boys and a 3-fold increase in risk for girls for future suicide if they are dependent on alcohol[20]. Adolescents who are dependent on substances often have a number of other risk factors for suicide because of their proneness to impulsive and risk-taking behaviour, e.g., homelessness, financial problems etc. Presence of hopelessness, interpersonal and social difficulties, and life stress like academic failure are other risk factors. Stressful life events which might not seem particularly stressful to adults are often magnified in importance by adolescents' heightened self-consciousness, acute sensitivity to rejection, and emotional fluctuations. These include failing one or more subjects or breaking up with a boyfriend or girlfriend[21]. Other risk factors studied include temperamental characteristics like rigidity, persistence, distractibility and delinquency[22]. Adolescents who are bullied, as well as those who are the bullies, are at an increased risk of depression and suicidal ideation. Homosexuality and bisexuality have also emerged in recent longitudinal studies as significant risk factors for non-lethal suicidal behaviors in male and female teens[20].

The phenomenon of suicide clusters is presumed to be related to imitation. Suicide clusters nearly always involve previously disturbed young people who knew about each other's death but rarely knew the other victims personally. The relationship between adolescent suicide attempts and death by suicide and psychosocial functioning of peers has revealed that youth exposed to peer suicidal behavior are significantly more likely to have their own suicidal ideation and attempts, and to smoke cigarettes and marijuana, binge drink, be involved in a serious physical fight, and have inflicted injuries that require medical attention[23].

Early childhood development: Studies show that abuse in childhood increases the risk for suicide attempts in late adolescence. Havens et al studied the prevalence and correlates of attempted suicide among 2219 young injection drug users (IDUs) from six study sites in five US cities. Those attempting suicide were more likely to have a lifetime history of mental health facility admission or sexual abuse as compared to those not reporting a recent (past 6 months) suicide attempt[24].

Neurobehavior disinhibition (term used to describe the interaction of numerous biobehavioral traits and environmental variables and indexed by indicators of executive cognitive functioning, emotion regulation, and behavior control) during the childhood has been proposed as a risk factor for the subsequent use of substance and suicidal attempt during adolescence. In a sample of 227 boys, Tarter et al, found that neurobehavior disinhibition at age 16 predicted propensity to suicide and presence of substance use disorder between 16 and 19 years[25].

Parenting: Studies suggest that adolescent suicide is associated with certain factors like poor parent-adolescent communication, interpersonal conflicts and losses. Whereas non-users are more likely to describe close relationships with parents, users more frequently indicate they do not want to be like their parents and do not need their approval or affection[26].

Researches on familial risk factors have shown that family history of suicidal behavior increases risk whereas research on parental psychopathology, parental divorce, and parent-child

conflict is inconclusive[27]. Parental substance use disorder is also a predictor of future substance use in the adolescents[28]. Perception of risk associated with the use of the substance by adolescents is also shaped by parental attitudes and can influence the use of substances among youth. Use of marijuana by parents increases the risk of the child using marijuana 2-fold, even after adjusting for socioeconomic status, attitude, and behavior[6]. Adolescents who perceived little risk from using marijuana were 12-times more likely to have used marijuana than were adolescents who believed that there was a greater risk[6].

Additionally, lower SES has also been found to be a risk factor for adolescent suicide attempts and completions[29].

Role of media: A recent study showed that young people get their information on suicide from the media[30]. There is conflicting evidence on the effect of the media's portrayal on suicide. However, it is generally believed that the act of committing suicide can be facilitated in vulnerable teens by exposure to real or fictional accounts of suicide. The risk is especially high in the young, and it lasts for several weeks.

Protective factors

While a host of factors predispose the adolescents to the risk of suicide others tend to confer protection against it. Studies indicate that family cohesion and religiosity serve as protective factors for adolescents against suicide[31].

A conceptual model based on developmental psychopathology

Although alcohol and drug use are considered to be risk factors for suicidal behaviors in adolescence, the precise nature of the relationship between suicidality and substance abuse, and the implications of this relationship for prevention and treatment interventions remain elusive. Windle et al have put forth a developmental psychopathology conceptual model to represent the major categories of risk and protective factors to predict suicidal behaviors. It was proposed that distal factors act through a set of intermediate set of factors that in turn influences suicidal behaviour. These distal factors include difficult temperament, coping motives for drinking, lower family support and higher percentage of friends using alcohol. These factors serve as predisposing factors for mediators such as depression, stressful events and binge drinking that eventually directly predict suicidal behaviors. Binge drinking significantly predicted suicide attempts over and above the influence of depression and stressful events[21].

MANAGEMENT

The association of adolescent substance use and suicide makes it important for the clinician to closely monitor adolescents with substance use disorders for suicide risk. A clear and complete evaluation and clinical interview provide the information upon which to base the intervention. The clinician should gather information from as many sources as possible and keep in mind the complexity of the interaction between adolescents' use of substance and suicide and multiple intermediate contributory factors. Because of the higher prevalence of suicidal ideation and attempts in youth exposed to peer suicidal behavior the professionals need to be vigilant about these risks in friends of those who have attempted or died by suicide[23]. The risk for suicide can be quantified using scales, although one should be aware of the limitations of application of these scales. The condition of the individual should be reassessed periodically depending on the circumstances. All the assessments should be documented in detail.

Various interventions have been suggested to reduce the rate of suicide among adolescents. These include detection and treatment of depression, substance misuse and

schizophrenia; marital counseling, controlling unemployment, poverty and the availability of suicide methods; promoting responsible media reporting of suicide; and creating education programs[32]. Interventions for adolescent substance users need to be multifaceted, from early detection and treatment of substance use and associated psychiatric co-morbidity, to improving problem-solving and coping skills, to controlling youths' access to the means of attempting suicide. A suicidal patient is treated initially in a secure, safe, and highly supervised place, e.g. as an inpatient if the facilities are available. Because of the limitation of the randomised clinical trials on the issue, management is based on existing clinical knowledge of risk factors for suicidal behaviour, efficacy of treatment for substance dependence or relevant co-morbid conditions and problems known to be common in treatment settings[33]. In the initial stages this would include detoxification and management of withdrawal features. Appropriate psychopharmacological and non-pharmacological intervention should be initiated following detailed psychiatric evaluation. The subsequent management could be undertaken in a series of outpatient treatments in less restrictive settings depending on the condition of the individual. Among adolescents family therapy may be of special value in treating substance use disorders and there by reducing the associated risk of suicide[34].

Prevention

Research has examined prevention strategies in school, community, and healthcare settings. Interventions seek to identify cases for either referral or treatment or for risk factor reduction. School-based prevention programs include suicide awareness curricula, skills training, screening, gatekeeper training, peer helpers, and postvention/ crisis intervention. The most successful of these strategies have been the screening and skills training strategies. The latter serves to develop problem-solving, coping, and cognitive skills[35]. Some programs have had unintended negative effects by making at-risk youth more distressed and less likely to seek help[36]. Community-based prevention programs include crisis centers and hotlines, restrictions of firearms, and media education. These are likely to have benefit, but more research is needed. Media education has been very effective in Europe[20]. Finally, training primary care physicians and pediatricians has been a focus for prevention. This training is likely to be effective if enforced and supported. Implementing strict laws regarding use of alcohol and other substances of abuse by adolescents has also shown to bring down the suicide rate. Carpenter compared the variations across US states in the timing of adoption of tougher drunk driving laws that set very low legal blood alcohol limits for drivers under age 21. It was found that these laws reduced heavy episodic drinking by underage men and led to a 7%-10% (statistically significant) reduction in suicide among young males aged 15-17 and 18-20 years[37].

It has been suggested that a comprehensive general strategy for the prevention of suicide behaviour should consist of research, improving services, training and information on suicide, and focusing on special groups. One approach to reduce adolescent suicide is to promote overall mental health among school-aged children and adolescents by addressing early risk factors for depression, substance abuse and aggressive behaviors. Suicide warning signs and risk factors are similar for people who abuse alcohol or other drugs and people who do not. Comprehensive programs designed to reduce these risks are likely to reduce the incidence of suicide.

Providing young people with effective outlets to connect with others and focus their energies can assist them in the challenges they face in growing up and can prevent drug use. Analysis of data from the 2003 National Survey on Drug Use and Health (NSDUH) revealed that

youths who had talked with a parent about drugs were less likely to use illicit drugs than were those who had not. However, only 59% of those surveyed reported having a conversation with their parents. The study also revealed that 91% of adolescents aged 12-17 reported engaging in some organized (school-based, community-based, and faith-based) activity; those who did were less likely to use marijuana and illicit drugs compared with adolescents who did not participate in organized activities[38]. These results are consistent with other reports that found that adolescents who participated in team sports were less likely to use any illicit drug compared with those who did not, and were also more likely to report disapproval of peer use of illicit drugs compared with non-participants.

Research has shown that increased access to drug treatment, community mental health, and violence prevention programs may decrease suicidal behavior among young injection drug users[24].

CRITIQUE OF CURRENT STUDIES AND FUTURE DIRECTIONS

Major limitations of the studies assessing the role of substance use in adolescent suicide have been the lack of control groups (for evaluating risk conferred by substance use), selection and ascertainment bias, and small sample sizes. Also there are several conceptual issues that need to be addressed when considering the substance abuse-suicidality relationship. These would range from finding the most appropriate ways of defining and assessing suicidal behaviors, ways to address the heterogeneity across different adolescent populations, finding factors potentially affecting the trajectories of both substance abuse and suicidality and their temporal variability. In a similar vein it should be appreciated that the use of substances extends over a continuum ranging from recreational use, occasional use, harmful use, abuse and use in dependent pattern. However, the studies carried out in the field of the substance use have often failed to address the issue as a continuum based problem. The use of categorical perspective fails to take into consideration the role of non dependent use of substances in associated conditions including suicide. Similarly, use of commonly used cut off parameters for adults might not be applicable to the adolescent substance use disorders. The same may hold true for associated mental disorders in this population. Careful consideration and exploration of these issues hopefully should improve our understanding the substance abuse-suicidality interrelationship, and ultimately the development of more effective prevention efforts and treatments for youths with both problems.

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Dr. Anju Dhawan, Associate Professor, National Drug Dependence Treatment Center (NDDTC) and Department of Psychiatry,
Dr. Yatan Pal Singh Balhara, Senior Resident, Department of Psychiatry,
Dr. Natasha, PhD Scholar, Department of Psychiatry,
All India Institute of Medical Sciences (AIIMS), New Delhi, India- 110029.
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