Depression, aggression and suicide ideation among adolescents in Alexandria

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ABSTRACT

Objectives: The aim of this study was to measure the adolescents' attitude towards suicide, to assess the magnitude of the problem of suicidal ideation or attempt and to study its correlation among a non clinical, non deviant sample of high school adolescents aged 14-19 years in Alexandria, Egypt.

Methods: A multistage stratified random sample of 1621 students of both genders was taken from 12 secondary schools in Alexandria, Egypt in the year 1996. A self-report questionnaire including demographic data, potentially associated factors with suicide, Child Depression Inventory (CDI), Adolescent Aggression Scale (AAS), Attitude Towards Suicide Scale (ATSS), in addition to 4 other questions investigating whether adolescents were preoccupied by death, having a death wish, think to harm themselves or tried to harm themselves during the year prior to the study were applied to the selected sample.

Results: High scorers of CDI, AAS and ATSS were more likely to be preoccupied by death, having a death wish, think to harm themselves or try to harm themselves (without serious medical morbidity) than low scorers. History of physical abuse during childhood, family history of attempting suicide and personal history of mental illness were the most important associated variables for the adolescents who have tried to harm themselves during the year prior to the study.

Conclusion: Suicide ideation or attempt is a public health problem in adolescence in Alexandria. Primary care providers both in the office and in the community should enhance preventive efforts.

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Depression, drug dependence, epilepsy, mental retardation and psychiatric emergencies are mental disorders identified by Kotry and Baather[1,2] as priority conditions in Egypt. Morbidity and mortality trends for young people in developing nations are increasingly paralleling those in the industrialized world. As infectious causes of mortality diminish, unintentional injuries, suicide, homicide, war and maternal morbidity represent the primary causes of death in the second decade of life for most nations where data are maintained.[3] Violence is one of the most serious problems that society and the public health sector, in particular, has to deal with today. Agudelo[4] analyzed the different forms of violence: violence that impairs health (torture, disappearance, rape, child abuse and elderly abuse) and violence that kills (suicide, homicide and war).

Over the past decades the rate of completed suicide has remained quite stable, that of suicide attempts even seems to have increased. These are puzzling observations, as depression is the major suicide precursor and as antidepressants over the years have been increasingly used in the treatment of depression. These observations have not attracted

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sufficient attention, possibly as they do not accord with consensus opinions on depression treatment in psychiatry today.[5] One aspect of youth suicide of particular concern is the repeated reports of suicide outbreaks among young people. These outbreaks have been reported from as long as ancient Grecian times and from around the world. They recently have been called suicide clusters.[6] The possible causal mechanisms of increased adolescent suicide rate all over the world are the corresponding increase in the prevalence of depressive disorders, the corresponding increase in the prevalence of substance abuse and substance abuse disorders and lowering of age of onset of abuse, psychobiological changes, in particular the dramatic lowering in the age of puberty, the increase in the number of social stressors with extensive consequences for youth, and the changes in attitudes towards suicidal behaviors and the related increase of suicidal models.[7]

The aim of the study was to measure the adolescents' attitude towards suicide, to assess the magnitude of the problem of suicidal ideation or attempt and to study its correlation among non clinical non deviant sample of high school adolescents aged 14-19 years in Alexandria, Egypt.

Methods. ***Selection of subjects.*** A multistage stratified random sample of governmental high school students have been chosen representing the 6 districts of Alexandria, Egypt in the year 1996. Two schools of different gender have been selected randomly from each district, the total number were 12 schools. In each school, one class from each of the 3 grade levels has been selected randomly, the total number of classes were 36 and the total number of students was 1621 of both genders.

Research instruments. A self report questionnaire, which was constructed for the previously mentioned adolescents' sample was used to collect the following data: personal data; name of the school, grade level, age, gender, birth order, personal history of chronic organic and mental disorders, number of close friends, relationship to parents, friends and teachers, personal history of physical abuse, school satisfaction, drop class due to poor scholastic achievement, sports and hobbies, personal history of cigarette smoking, familial characteristics of the students, family coherence, family history of chronic organic, mental disorders, and suicidal ideation or attempt.

Attitude Towards Suicide Scale (ATSS).[8-10] The adolescent life change events scale (ALCES) was translated into Arabic by the author and the most stressful events in the scale according to the Life Change Units (LCU) have been selected and rephrased as questions with a header "what would you do on facing this problem?" The respondent must answer every question either by adjusting with the problem (=0), thinking of suicide (=1), put a suicide plan (=2) or attempting suicide (=3). The scale consists of 19 questions, thus, the total score ranges from 0-57. To validate the scale, a pilot sample of 73 students of different gender were randomly selected and subjected to the scale. A correlation matrix between every item of the scale and its total score was calculated. Items of negative or non-significant positive correlation coefficient were deleted and only 19 out of 21 items remained. Split half reliability for another randomly selected 40 students was 0.77 .

Child Depression Inventory (CDI).[11,12] The CDI which consists of 27 multiple choice questions and items that cover an array of overt symptoms of a child and adolescent depression such as sadness, lack of interest, sleep and appetite disturbance. Each CDI item assesses one symptom by presenting 3 choices ranging from 0-2 in the direction of increasing psychopathology. Thus, the CDI total score ranges from 0-54. The Arabic version was translated, constructed and standardized by Abou-Nazel in 1990 where test-retest reliability was 0.90 and by Afifi in 1998.[11,12]

Adolescent Aggression Scale (AAS).[13,14] The scale was translated and standardized by the author. The scale consists of 14 questions (items) covering a separate array of aggressive symptoms for each gender. The respondent must answer every question either by no (=0), sometimes (=1) or yes (=2), thus, the total score ranges from 0-28.

To validate the scale a pilot sample of 73 students of different gender were randomly selected and subjected to the scale. A correlation matrix between every item of the scale and its total score was calculated. Items of negative or non-significant positive correlation coefficient were deleted and only 14 out of 19 items remained. Split half reliability for another randomly selected 40 students was 0.76 for boys and 0.65 for girls.

The 4 suicide outcome variables. At the end of the questionnaire all the school adolescents were asked with 4 questions; whether they have (or not) been preoccupied by death, having a strong death wish, have thought to harm themselves or have tried to harm themselves during the year prior to the study. Each question was considered as a binary (0, 1) outcome variable in the analysis. It took approximately 45 minutes from the students to fill the questionnaire (a class session).

Pre-test, data processing and statistical analysis. Pretest of the questionnaire, has been conducted on 100 students of different gender as a pretest before running the study. Data coding, entry and management was carried out using EPI Info Statistical program, followed by data analysis using Statistical Package for Social Sciences (SPSS) version 6 for Windows. Data are given as means

standard deviation (SD) and percentages. Partial correlation between the 3 scales used (ATSS, CDI, AAS) was conducted. Multivariate logistic regression was conducted to test the most important associated factors with the studied dependent variables and having the adjusted odds ratios (OR) of these factors. The dependent variables are the 4 suicide outcome variables; preoccupied by death, wish death, think or try to harm oneself. The predictor variables are the 3 scales used; ATSS, CDI and AAS controlling for a range of potential confounding variables including age (years), gender, birth order (1-9), family coherence (parents living together, separated, divorced or widowed), adolescents' relationship to parents, to teachers, to friends (good, not good, bad), number of friends, school satisfaction (yes, no), history of dropping class (yes, no), family history of organic illness, of mental illness, of suicide (yes, no), personal history of organic illness, of mental illness, of physical abuse (yes, no), doing sports (yes, no), having hobbies (yes, no), and cigarette smoking (never, current, former). Adolescents' responses to the 3 scales used were categorized into 3 levels on the basis of distribution of the scores in this population: the first level which is the reference category (RC) below the 50th percentile, the second level 50-75th percentile and the third level is upper quartile.

The odds ratio shows the change in the odds of the studied dependent variable when the independent changed from 0-1 in dichotomous variables or by one unit in categorical or continuous variables. A p value of <0.05 was considered statistically significant.

Receiving operating characteristics (ROC) analysis was used to evaluate the diagnostic accuracy of the ATSS, the CDI and the AAS to detect adolescents having tried to harm themselves in the year prior to the study. The ROC curve expresses the sensitivity and specificity for each scale's score, and represents an index of the overall ability of the scale to discriminate between adolescents with or without such risk. The estimation of the area under the curve (AUC) quantifies this accuracy. The AUC values range from 0.5 (no discriminatory ability) to 1.0 (perfect discrimination).[15-17] Three ROC analyses were performed where the question of whether adolescents have tried to harm themselves was used as case definition or criterion. The diagnostic accuracy of the 3 scales to detect adolescents tried to harm themselves was evaluated one by one in the 3 ROC analyses curves. The cut off points that insured best trade off between sensitivity and specificity in the 3 curves as well as the corresponding sensitivity and specificity were reported.

Ethical issues. No direct or indirect identification of the studied participants has been used to ensure confidentiality. In addition, written approval from the Directorate General of Education as well as a verbal consent from the students were taken.

Results. **Table 1** shows selected demographic characteristics of the study sample and some associated factors with adolescents' suicide. Approximately 51% of the sample were male, the mean age of the sample was 15.77 year (SD = 1.36), while the adolescent's birth order ranges between 1-9 with a mean of 2.45 and SD = 1.58. Approximately 10% of the sample live in a single parent family where their parents were either separated, divorced or widowed. Approximately 38% of the sample viewed their relationship with their parents as either not good or even bad while higher percentages had the same view regarding their relationship with their teachers (63%) or friends (45%). Only 9% had no close friends and more than half of the adolescents were not satisfied with their schools. Dropping class in any year of their academic life resulting from poor scholastic performance occurred to 16% of the adolescents. Approximately 24% had family history of chronic organic or physical illness, 6.2% had family history of mental illness and approximately 6% had family history of suicide ideation or even attempt. Approximately 7% also reported having chronic organic illness, 12% had emotional or mental problem and 20% were physically abused by their parents during their childhood. Most of the studied samples had hobbies and were playing sports and 13% were currently cigarette smokers. Their score of the CDI ranged 0-43 with a mean $\pm$ SD of 13.02 $\pm$ 6.34, while the score of AAS ranged 0-26 with a mean $\pm$ SD of 10.85 $\pm$ 4.55 and the score of ATSS ranged 0-42 with a mean $\pm$ SD of 5.36 $\pm$ 6.16. The 3 scales' scores were significantly positively correlated with each other after controlling the age and gender. (Coefficient for CDI and AAS = 0.46, coefficient for CDI and ATSS = 0.31, coefficient for ATSS and AAS = 0.30, $p<0.01$, data not shown in table)

Forty-four percent of them were preoccupied by death in the year prior to the study, 30% had a strong death wish or thinking of harming themselves and 6.7% tried to harm themselves but none of them had any severe medical morbidity. Several logistic regression models were run where the 3 scales (CDI, AAS, ATSS) scores were entered one by one as a predictor variable to one of each of the 4 suicide outcome variables. Adjusted OR were calculated after controlling either only the age and gender, or for all the potential confounders mentioned. **Table 2** shows that there was significant increase in the likelihood of occurrence of each of the 4 outcome suicide variables with each of the 3

Table 1 - Selected characteristics and associated factors with suicide in the study sample, n=1621.

Characteristics	mean ± SD	%
Age in years	15.77 ± 1.36	
Gender, male %		50.6
Birth order	2.45 ± 1.58	
Family coherence, divorced, separated or widowed		9.8
Relationship with parents, not good		33.5
Bad relationship with parents		4.3
Relationship with teachers, not good		59.6
Bad relationship with teachers		3.8
Relationship with friends, not good		43.7
Bad relationship with friends		1.4
Number of close friends, no friends		8.8
School satisfaction, not satisfied		52.4
Dropping class before		16.3
Positive family history of organic illness		24.4
Positive family history of mental illness		6.2
Positive family history of trying to harm oneself		5.7
Positive personal history of organic illness		6.8
Positive personal history of mental illness		11.8
Positive personal history of physical abuse		20
Doing sport		56
Having hobbies		86.4
Cigarette smoking, current		12.8
Ex-smokers		14.1
Child Depression Inventory score	13.02 ± 6.34	
Aggressive symptomatology score	10.85 ± 4.55	
Attitude towards suicide	5.63 ± 6.16	
Preoccupied by death in the year prior to the study		43.8
Think to kill oneself in the year prior to the study		30.2
Have a strong death wish in the year prior to the study		29.6
Trying to harm oneself in the year prior to the study		6.7

Table 2 - Adjusted odds ratio of the 4 suicide outcome variables according to level of depression, aggressive symptomatology and attitude towards suicide scores.

Variables	Try to harm oneself	Strong wish to be dead	Think of killing oneself	Preoccupied by death
*Depressive symptomatology**				
0-12	1	1	1	1
13-17	3.46	2.48	3.15	2.15
18-43	10.01	5.75	7.03	3.89
Depressive symptomatology†				
0-12	1	1	1	1
13-17	2.56	2.24	2.84	1.98
18-43	5.65	4.71	5.42	3.21
*Aggressive symptomatology**				
0-11	1	1	1	1
12-14	1.57	2.01	2.27	1.77
15-26	3.21	2.67	3.71	3.25
Aggressive symptomatology†				
0-11	1	1	1	1
12-14	.96	1.65	1.81	1.58
15-26	1.74	1.89	2.72	2.77
*Attitude towards suicide**				
0-4	1	1	1	1
5-8	2.41	2.37	2.45	1.72
9-42	4.58	2.66	3.99	1.97
Attitude towards suicide†				
0-4	1	1	1	1
5-8	2.18	2.21	2.26	1.61
9-42	3.67	2.42	3.56	1.73

* - Odd ratio adjusted only for age and gender by logistic regression, † - Odd ratio adjusted for age, gender, birth order, family coherence, relationship to parents, to teachers, to friends, number of friends, school satisfaction, history of dropping class, family history of organic illness, of mental illness, of suicide, personal history of organic illness, of mental illness, of physical abuse, doing sports, having hobbies, and cigarette smoking by logistic regression

Table 3 - Adjusted odds ratio of the 4 suicide outcome variables according to levels of scores of depression, aggressive symptomatology, and attitude towards suicide.

Variables	Try to harm oneself	Strong wish to be dead	Think of killing oneself	Preoccupied by death
Attitude towards suicide				
0-4	1	1	1	1
5-8	2.10	2.01	1.99	1.42
9-42	3.20	1.99	2.85	1.38
Depressive symptomatology				
0-12	1	1	1	1
13-17	2.35	2.03	2.24	1.67
18-43	4.95	4.21	3.89	2.53
Aggressive symptomatology				
0-11	1	1	1	1
12-14	NS*	NS*	1.36	1.37
15-26	NS*	NS*	1.60	2.10

NS* = Odds ratio not mentioned as they were non significant, Odds ratio - adjusted for age, gender, birth order, family coherence, relationship to parents, to teachers, to friends, number of friends, school satisfaction, history of dropping class, family history of organic illness, of mental illness, of suicide, personal history of organic illness, of mental illness, of physical abuse, doing sports, having hobbies, and cigarette smoking by logistic regression

predictor scales adjusted either for age and gender only or for all potential confounders. Higher adjusted OR of the 4 suicide outcomes variables were noticed according to levels of CDI in comparison to the other 2 scales (AAS, ATSS) used.

In **Table 3**, the 3 scales were entered simultaneously in the logistic regression model. The 3 scales predicted the 4 suicide outcome variables even after adjusted to each other and to other potential confounders. In many logistic regression models, it was also found that female gender was more likely to think or try to harm themselves, to have a strong death wish or to be preoccupied by death by 1.5-2.8 folds more than male gender. Physical abuse during childhood increased the likelihood of the 4 suicide outcome variables by 1.5-2 folds in some models. Family history of suicide ideation or attempt increased the same outcome variables by 1.6-4 folds. Personal history of mental or emotional illness increased that by 1.5-2.5 folds. Other factors such as poor relationship with parents, currently smoking cigarettes, fewer number of close friends, poor school satisfaction were associated with the outcome variables in some models.

The ability to identify adolescents who have tried to harm themselves by the 3 diagnostic scales (found to be significantly associated in the previous logistic regression models) is reported in **Figures 1-3**. In **Figure 1**, the diagnostic ability of ATSS to detect adolescents who have tried to harm themselves was determined by the AUC which equaled 0.701. The cut-off score that could give best trade of sensitivity and specificity was 5.5, where sensitivity = 0.688, specificity = 0.608. In **Figure 2**, the diagnostic ability of AAS to detect adolescents who have tried to harm themselves was determined by the AUC which equaled 0.674. The cut-off score that could give best trade of sensitivity and specificity was 11.5, where sensitivity = 0.656, specificity = 0.577. In **Figure 3**, the diagnostic ability of CDI to detect adolescents who have tried to harm themselves was determined by the AUC which equaled 0.788. The cut-off score that could give best trade of sensitivity and specificity was 14.5, where sensitivity = 0.781, specificity = 0.63. Unfortunately, SPSS version 9 did not give the facility to show more than one area in the curve or to carry out test of equality of areas to compare between the diagnostic ability of the 3 scales to detect the outcome variable.

Discussion. To the best of our knowledge, the current study is the first study to investigate adolescents' suicidal ideation or attempt as well as to measure the attitude towards suicide in a non clinical non deviant sample of adolescents. However, the study still has its limitation. The 3 scales used were not validated against a gold standard test as the Revised Clinical Interview Schedule (R-CIS) or the Composite International Diagnostic Interview (CIDI).[18] Nevertheless, there is no fear from different cultural norms as the scales have been used in Egypt in previous studies. Although self-reported questionnaires are easy to apply, they might also elicit inflated or false responses especially in such a sensitive subject. One possible way to overcome this problem was to design a 2-phase study in order to evaluate sensitivity and specificity of the questionnaire results. However, it was not logistically feasible in this study. Lastly, it is difficult to show how representative is this students' sample in Alexandria

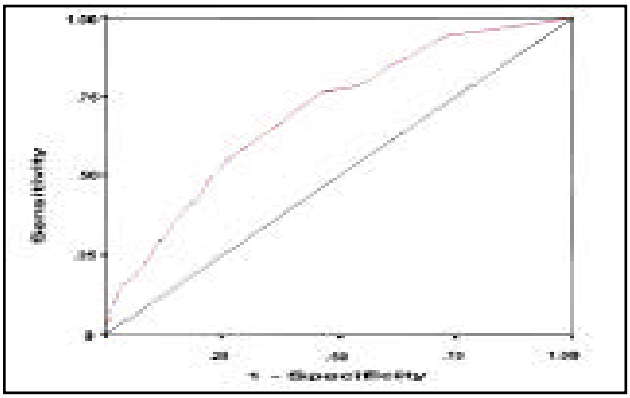

Figure 1 - Receiver operating characteristics (ROC) curve for the detection of adolescents who tried to harm themselves in the year prior to the study. The area under the curve (AUC) (95% CI) is 0.701 (0.649-0.753) for the attitude towards suicide scale.

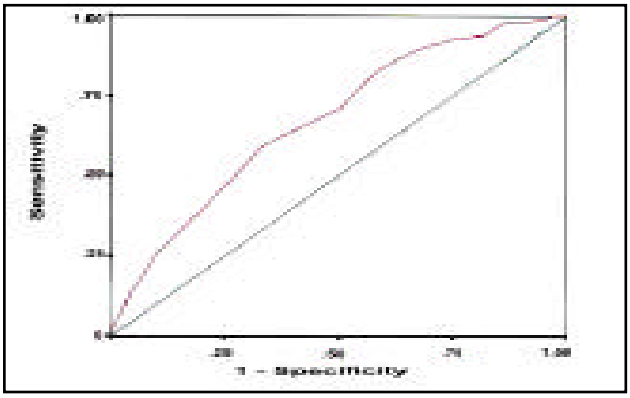

Figure 2 - Receiver operating characteristics (ROC) curve for the detection of adolescents who tried to harm themselves in the year prior to the study. The area under the curve (AUC) (95% CI) is 0.674 (0.621-0.728) for the Aggressive Symptomatology Scale.

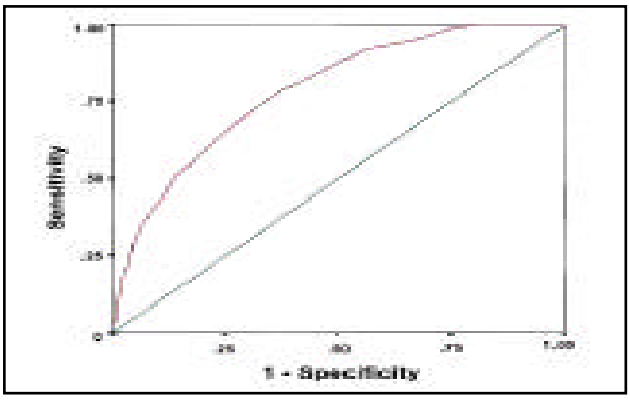

Figure 3 - Receiver operating characteristics (ROC) curve for the detection of adolescents who tried to harm themselves in the year prior to the study. The area under the curve (AUC) (95% CI) is 0.788 (0.745-0.832) for the Child Depression Inventory.

in the Egyptian adolescents. Alexandria is a cosmopolitan city and the second biggest city in Egypt after Cairo the capital. Nevertheless, the sample is big enough despite its probable flaws.

The current study revealed that suicide ideation and attempt were common among Egyptian adolescents. Thirty percent reported that they had a strong death wish or had a plan to harm themselves. Unfortunately, there is no similar study in Egypt or the Arab world conducted on non clinical non deviant sample to compare with. As the relatively low incidence of suicide and as many people who commit suicide die without having prior contact with treatment centers, the most feasible and commonly used suicide research design has been case control study in which retrospective inquiries are made on abnormal behaviors of symptoms present before death (like psychological autopsy technique).[19] In Egypt, Rashed et al[20] found that 95% of suicidal attempts in Alexandria were below 30 years and 75% of them were between 15-20 years. Similar results was found by Hamdi et al[21] in El Emirates. Ali[22] stated that suicide and attempted suicide rate in Arab countries and Egypt has significantly increased. He noticed that in Cairo, Egypt, attempted suicide rate has increased from 2.8 per 100,000 in 1959 to 38 per 100,000 in 1979. He also added that 60% of the attempters were between 15-24 years of age.

In the Arab countries we still know little on the causes of suicide. Generally, mental health is still a neglected component in our health services. Many health care providers are confused on the practical relevance of psychosocial and behavioral science in general health care. Most of them are not trained on the prevention of mental disorders as well as diagnosis, treatment and rehabilitation of people with mental disorders.

A substantial majority of suicide victims would likely have met criteria for some form of psychiatric disorder.[19] The most common of such pre-suicide diagnosis are alcohol abuse, depression, anxiety disorders and aggressive behavior. There is also a link between suicide and social ills as unemployment or population pressures on educational or occupational resources.[23] The current study confirms the relationship between suicide ideation or attempt with depression and aggression. There is also no conflicting evidence on the association of some selected socio demographic variables in the current study. This is in accordance with other research results where adolescents' suicidal behavior was found to be frequently a symptom of prolonged and progressive family disruption, disturbed parent-child relationship, and inadequate communication.[5] Adolescents might have feelings of hostility and rejection due to isolation and might be more prone to think of suicide. In

addition, social disintegration reduces the threshold of impulsive behavior.[24-25]

Primary care providers should regard suicide as potentially preventable as they do other injuries. Despite presenting with primarily medical complaints, almost half of young people presented to primary care physicians had high levels of psychological distress and almost a quarter had a high level of suicidal ideations.[26] The recent suicide prevention strategies during the last 10 years including, school based skills training for students, screening for at risk youth, education of primary care physicians, need continuing evaluation studies.[27] Smith and Scoullar[28] highlighted the need for ongoing education of general practitioners as an essential component of prevention strategies for youth suicide.

Moreover, there has been a long standing interest in using the classroom to improve student mental health by using school curricula to boost a child's social competence and his ability to effectively function with peers.[29]

Providing children and adolescent with a set of social problems solving skills, including the generation of alternative solutions, that is reinforced by modeling behavior in the classroom, may provide them with a repertoire of behavior strategies that will enhance their resilience to difficult emotional challenges.[30] Added to the above, is the strategies that target acute precipitating factors that lead to suicidal attempts. These strategies include the use of crisis centers and hot lines.[31]

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