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Prevalence of posttraumatic stress disorder and associated disorders among adolescents in public schools: a cross-sectional study

KHALID ASTITENE*

Health and Nutrition Research Team of the Mother and Child Couple, Faculty of Medicine and Pharmacy of Rabat, Mohammed V University, Rabat, Morocco

AMINA BARKAT

Department of Medicine and Neonatal Resuscitation, Ibn Sina Children's Hospital, Faculty of Medicine and Pharmacy of Rabat, Mohammed V University, Rabat, Morocco,

barakatamina@hotmail.fr

*Address For correspondence: Khalid Astitene, 210 hay al manzeh C.Y.M, Rabat, Morocco;

Email: ast_khialid@yahoo.fr

Abstract

Anyone can develop post-traumatic stress disorder (PTSD) following a traumatic event; this disorder can develop comorbid PTSD disorders such as anxiety and depression which could seriously interfere with the daily life of the adolescent who was be the subject of our study by evaluating the prevalence of PTSD in public schools and also evaluating the impact of this disorder. Among 94 schools, 10 high schools and 15 middle schools were selected. 1250 students were selected for a cross-sectional survey with an age of 12 to 17 years (14.98 ± 1.49). The survey was carried out during the period from March to June 2017. Standardized questionnaires (Life Events Checklist, CPTS-RI, STAIY and CDI) were used. A high prevalence of PTSD was found with 44.4% which is explained by the inclusion of the date of event from 1 month to 3 months and the specificity of a population of Moroccan schoolchildren (lack of social support, parental illiteracy, poverty, precariousness, unemployment) with 62% of PTSD in girls versus 38% in boys (p <0.001). Among adolescents in school with PTSD, anxiety was 78.81% and depression was 51.7% with a dominance of girls (p <0.001 for both disorders). We had found 73% of students who had declining academic results and 5.8% of adolescents had thought about suicide. Post-traumatic stress disorder has a negative impact on the well-being of adolescents, which is why it is necessary to adapt suitable treatments immediately after a traumatic event or during the disease.

Key words Adolescence, Associated disorders, Posttraumatic stress disorder, School students, Traumatic events

1. Introduction

Posttraumatic stress disorder (PTSD) has been the subject of several research studies in recent years on the epidemiological, neurobiological or therapeutic levels, but there are few studies in children and adolescents of school age, especially in developing countries. PTSD is classified as a severe anxiety disorder and is a major public health problem around the world.
When a person has been exposed to an assault or a sudden threat involving his life or his physical or mental integrity, he immediately presents an alarm reaction to face this assault [1].
According to the DSM-IV classification [2], the diagnosis of PTSD requires exposure to a traumatic event (the person has been exposed or witnessed or confronted with one or more events that have involved death or threat of death, or serious injuries or a threat to their physical integrity or that of others), and the fact of having reacted to them with a feeling of intense fear, helplessness or horror.

These events can have different consequences in a person's life, such as leading to the development of posttraumatic stress disorder (PTSD), characterized by symptoms such as re-experiencing the traumatic event, avoidance, negative cognitions and neurovegetative hyper-activation [3]. Although most people exposed to a traumatic event do not develop any mental health difficulties, some individuals exhibit vulnerability factors that have both short and long term effects [4]. As a whole population can experience difficulties following a traumatic event, some groups of people seem to be more at risk than others [5].
Thus, adolescents constitute a population particularly at risk of developing a mental health disorder following a traumatic experience, given that the coping strategies to cope with psychologically trying situations have not yet been conclusively consolidated [5,6].

Studies have shown the peculiarities of the symptoms of PTSD in children and adolescents [7]. One may be surprised by the fact that, having gone through situations of extreme danger, such a person develops PTSD, and another remains psychically unscathed [8]. PTSD is very common in the presence of comorbid psychopathological disorders and among these most common disorders we can find anxiety and depression.
Due to the significant impact of PTSD on the lives of children and adolescents attending public middle schools and high schools in the prefecture of Salé in Morocco, our study

presented the magnitude of this impact by studying the effect of PTSD on school and social life such as suicide, sleep disorders, concentration, substance abuse and others. For this reason, the prevalence of PTSD and the prevalence of disorders associated with PTSD (anxiety and depression) had to be studied. Namely that very few studies that have been done to study the prevalence of PTSD in Morocco and no study has been done to study the prevalence of PTSD in school-going adolescents.

2. Methods

2.1. Population and procedure

At the level of the town of Salé where the survey was carried out, we randomly selected 10 high schools and 15 middle schools from 37 high schools and 57 middle schools, we had took 50 students for each public school and as a result we had a sample of 1250 schooled adolescents with an age of 12 to 17 years. The study was in the form of a cross-sectional survey from March 2017 until June 2017. The participation rate for the study was 78.56% (982 students) because 268 students refused to participate in the study.

After having had the written approval of the Ministry of National Education and Scientific Research and with the collaboration of the directors of high schools and middle schools who had read the letter of authorization from this ministry to carry out the survey, I had explained to the principals the purpose of this study and the student's acceptance criteria for the survey (to be currently educated, to be present at school during the study , not to exceed the age of 17 years and not to have a mental handicap).

I had distributed a newsletter to each student explaining the purpose of the study and I had also distributed informed consents to be signed by their parents or guardians. After a week, 268 students had not given their informed consents so they refused to participate in the study, therefore 982 adolescents gave their signed informed consents who had to fill out a socio-demographic questionnaire and then a list of life events, then there were students who did not experience any traumatic event and they numbered 111 students so we had 871 students who had to continue to complete the other questionnaires because the main criterion for continuing to participate in the survey is that the adolescent must had experienced or witnessed at least one potentially traumatic event. All questionnaires were anonymous.

The 5 different questionnaires which were used successively to collect the data and which presented the self-administered measuring instruments were a socio-demographic data questionnaire and the list of life events which presents stressful life events with 17 questions according to the DSM -IV [9].

2.2. Materials

Then a questionnaire was distributed to assess the symptoms of PTSD after exposure to a traumatic event [10], it was the CPTS-RI (Children's Post Traumatic Stress Reaction Index), this is a scale of 20 items intended for children aged 6 to 16. The level of severity of PTSD depends on the score obtained, a score between 12 and 24 indicates a low level of PTSD, between 25 and 39 a moderate level, between 40 and 59 a severe level and a score over 60 a very severe level, those with a score below 12 did not present posttraumatic stress disorder and the test time was 15 to 20 minutes.

Finally two questionnaires were distributed to assess the associated disorders which are anxiety and depression, the first questionnaire was carried out to assess the intensity of adolescent anxiety, it was the STAIY scale (State Trait Inventory Anxiety Form Y, French version by Brochon-Schweitzer and Paulhan, 1993) [11], this scale includes 20 items, the level of severity of the anxiety depends on the score obtained, a score greater than 65 (very high anxiety), 56 to 65 (high anxiety), 46 to 55 (medium anxiety), 36 to 45 (low anxiety), less than 35 (very low anxiety) and the test time was approximately 15 minutes. The last questionnaire was carried out to assess the intensity of depressive symptoms in adolescents aged 7 to 17, it was the CDI (Children Depression Inventory) scale [10], this scale includes 27 items, the presence or absence of depression depends on the score obtained, a score less than 15 proves the absence of depression and a score equal to or greater than 15 proves the presence of depression. The test time was approximately 20 minutes.

2.3. Data Analysis

The processing and analysis of all statistical data received by the questionnaires was carried out by the statistical software SPSS version 20. Based on descriptive statistical analysis, the data were presented by number of persons (n) and percentage of persons (%). Continuous variables were expressed as mean and standard deviation. The comparison of quantitative variables was expressed using Student's t test. The comparison of the qualitative variables was expressed by a chi-square test ($\chi 2$). For a comparison between continuous variables, Pearson's correlation (r) was used. Statistical significance was considered at a p-value less than 0.05.

3. Results

3.1. Socio-demographic data

Table 1 shows the distribution of socio-demographic data and traumatic events. The average age of the students was 14.98 with a standard deviation of 1.497. The adolescents who had the father unemployed presented only 2.9% and while the mothers who did not work presented 83.7%. The average salary of both parents was 2.76 with a standard deviation 1.506, implying that the parents' monthly income was minus 4000 dh (Moroccan dirham) and so the resulting in low income. The mean frequency of smoking per week was 1.27 with a standard deviation 2.495, the mean frequency of drinking alcohol per week was 0.03 with a standard deviation 0.212, and the average frequency of illicit drug use per week was 0.47 with a standard deviation 1.517.

Of the 17 traumatic events listed, all of the students who reported that they did not have the traumatic event the participation in a fight or a war. Among the students who participated in the survey, the percentage of students who were at least exposed to one traumatic event in their lifetime was 88.69% (871 students). While the most traumatic event experienced by the students was the sudden and unexpected death of a loved one with 241 students followed by the traumatic event another very stressful experience with 152 students and followed by the accident traumatic event of public road with 82 students. The date of the traumatic event was between 3 months and 6 months because the average date of this event was 4.51 ± 1.70 months (**Table 1**).

3.2. Prevalence of posttraumatic stress disorder (PTSD)

Using the results of the CPTS-RI scores obtained, we had found 484 students who did not present with posttraumatic stress disorder (55.6%) and 387 students who presented PTSD (44.4%). In terms of the percentage of posttraumatic stress disorder by gender and the adolescents who had PTSD, we had found 38% in boys (n = 147), while in girls 62% (n = 240), so girls had a higher percentage of PTSD than boys.

3.3. Prevalence of comorbid disorders

Using the results of the STAIY scores obtained for students with PTSD, we had found 82 students who did not have anxiety (21.19%), 124 students who presented with low level of anxiety (32.05%), 71 students with moderate level of anxiety (18.34%), 73 students with

severe level of anxiety (18.86%), 37 students who presented with very severe level of anxiety (9.56%). So, the students who presented anxiety were 305 students with a percentage of 78.81%. The adolescents who presented with anxiety, we had found 33.11% in boys (n = 101), while in girls it was 66.88% (n = 204), so girls had a higher percentage of anxiety than boys.

Also using the results of CDI scores obtained for students with PTSD, we were found 187 students who did not have depression (48.3%) and 200 students who did have depression (51.7%). The adolescents who presented with depression, we were found 24% in boys (n = 48), while in girls it was 76% (n = 152), so the girls had a higher percentage of depression than boys.

3.4. The relation between PTSD and the different variables

Table 2 shows the difference in variables between adolescents without PTSD and adolescents with PTSD and between middle school and high school students. The monthly income of parents of students with PTSD were lower than students without PTSD ($p = 0.007$) and students with PTSD were younger than students without PTSD ($p = 0.002$). Students with PTSD had more sleep disturbance than students without PTSD ($p < 0.001$) and students with PTSD had more difficulty remembering things they learned at school or at home that students without PTSD ($p < 0.001$). Girls thought about suicide more than boys ($p < 0.001$) (**Table 2**).

Table 3 shows the difference of variables by sex and by school level and by presence of PTSD. There were significant relationships between PTSD and gender with $p < 0.001$ (girls developed more PTSD than boys), and between PTSD and level school (middle school students developed more PTSD than high school students) with $p < 0.001$. We had found significant relationships between the difference in gender and the experience of traumatic events with $p < 0.001$ (boys had more traumatic events than girls) (**Table 3**).

Table 4 shows the correlation between the different variables. The more the PTSD level had increased, the more difficulty the student had remembering things they learned at school or at home ($p < 0.001$), concentration ($p < 0.001$), and poor school performance ($p = 0.014$) has increased. The more the PTSD level has increased, the more the student's had desire to commit suicide had increased ($p < 0.001$) (**Table 4**).

4. Discussion

Faced with a traumatic event that upsets the psychic and biological balance, the adaptation mechanisms usually used by the exposed individual would be ineffective and the person would feel overwhelmed by the emotion with an impression of being overwhelmed and anchored [12] . This could cause various discomforts and symptoms that would cause clinical manifestations characteristic of PTSD and which presents the most common syndrome after a traumatic event [3,8,9]. Given the interest of the study of PTSD in school-going adolescents and especially also because of the studies that were few concerning these adolescents in relation to adults [13, 14, 15]; we had chosen this type of population. According to Shaw's epidemiological study [5], adolescents were at the same risk as adults of being exposed to traumatic events. According to some studies, adolescents experienced traumatic events more often than adults [16]. The lifetime prevalence was around 100% for adolescents who would have been exposed to at least one traumatic event [16,17,18]. Regarding our study, the percentage of students who were at least exposed to one traumatic event during their lifetime was 88.69%. Sensitive adolescents were less well prepared to cope with a traumatic event, which is why they were more likely to develop PTSD [19,20].

In our study, the sudden and unexpected death of a loved one of adolescents presented the most stressful traumatic event at 27.7%. The traumatic events most experienced by adolescents were the death of a family member, threat of violence, physical bullying at school [18]. Several studies show that boys have more traumatic events than girls [21,22]. For our study, it was found that adolescents experienced more traumatic events than adolescent girls ($p < 0.001$). Although an entire population can experience difficulties following a traumatic event, certain groups of people seem to be at greater risk than others [5]. Thus, adolescents constituted a population particularly at risk of developing a mental health disorder following a traumatic experience, given that the coping strategies to cope with psychologically trying situations would not yet be conclusively consolidated [5, 17,18, 23, 24] and among the risk factors of the population in our study were lack of social support, parental illiteracy, poverty, precariousness and unemployment.

The characteristics related to the event itself, individual and environmental characteristics would influence the impact of the traumatic event on the development of the various difficulties that an adolescent might experience [25,26] and the risk of developing a mental

health disorder, such as PTSD, is therefore increased [24,25,27]. PTSD can be suspected if an adolescent has difficulty overcoming a traumatic event after more than a month [9].
To calculate the level of severity of PTSD, we had chose to use the CPTS-RI scale which concerns a population aged 6 to 16 years and we were could go up to 17 years according to several studies [28, 29] as we had done for our study because of the terminal students who were 17 years old. Note that the CPTS-RI is one of the most widely used tools in the world for detecting PTSD and quantifying the intensity of the symptomatology given the good quality of its psychometric properties.

A local community could also be affected at various levels of PTSD depending on the magnitude, intensity and consequences of the event [24,30]. Depending on the instruments used, the differences between the populations studied, the type of trauma, the severity and chronicity of symptoms, the prevalence of PTSD had variable [31,32]. Symptoms of posttraumatic stress disorder in adolescents are said to be comparable to those in adults but with some age-related peculiarities in adolescents [33,34]. 44.4% of school-going adolescents were found to have PTSD and 55.6% of school-going adolescents who did not had PTSD. These adolescents were more likely to develop PTSD for several possible causes such as belonging to developing countries with low income such as the country where our survey was conducted [35]. Compared to adults and depending on several criteria such as the type of trauma experienced and the type of study carried out, the percentage of adolescents developing PTSD was high from 25 to 90% [36,37,38]. According to the results of our study, the percentage of PTSD among adolescent girls in school was higher compared to those in school, at 62% among girls compared to 38% among boys. Indeed, several studies have shown that girls developed more PTSD than boys [34,39].

In adolescents who suffered from PTSD, it has been observed that there is a presence of shame and guilt for what happened during a traumatic event [40]. The psychosocial difficulties following such an event would therefore be part of a continuum of stress responses ranging from no repercussions, to the development of PTSD including depressive and anxiety symptoms of the other. Difficulties concentrating, memory loss, behavioral problems as well as disturbed sleep, irritability, impulsivity, aggressiveness and adopting risky behaviors were also part of the difficulties [25]. Reviviscence and difficulty concentrating were believed to be the most frequent symptoms of PTSD in adolescents [41]. The results of some studies showed that adolescents have more memory difficulties [42]. In addition, some people would develop

depressive and anxious symptoms as well as risk-taking behaviors, such as problematic substance use (SPA) and the adoption of delinquent behavior [23,24,25,27]. Regarding the consumption of tobacco, alcohol and illicit drugs, we had found 27% of the consumption of tobacco and boys consumed significantly more than girls for all psychoactive substances.
In adolescents, we had notice the substance abuse, antisocial behavior, social withdrawal, somatic complaints, reduced academic performance, sleep problems, suicidal thoughts, and problems in their interpersonal relationships, and difficulties with concentration [16,37]. In our study, among adolescents with PTSD, we had found 17.4% who had difficulty remembering things the adolescent learned in school or at home. We had also found 73% of the students who had declining academic results, 34.5% showed difficulty concentrating and 5.8% of the adolescents who wanted to commit suicide and 39% of young people were prove guilty. The major depressive episode was the disorder most frequently found with a comorbidity ranging from 30 to 80% depending on the studies [43].

PTSD was very frequently encountered in the presence of comorbid psychopathological disorders such as anxiety and depression [44]. Compared to adults, young people were more vulnerable to anxiety and depression [45]. In our study, we had found high rates of anxiety level with 78.81% and depression with 51.7% for adolescents with PTSD. Namely, for anxiety, in girls it was 66.88% and 33.11% in boys and for depression it was 76% in girls against 24% in boys. Therefore, girls with PTSD presented more comorbid disorders than boys and indeed, according to several studies, girls had tend to have associated anxiety or depressive disorders more than boys [4,46].

5. Conclusion

The symptoms of Posttraumatic stress disorder go away within varying periods of time from a few months to a few years depending on the personality of the person and the existence of treatment. A large percentage of the population of Moroccan schoolchildren were have risk factors such as lack of social support, parental illiteracy, poverty, precariousness, unemployment which favorsed the onset of PTSD and anxiety and depressive disorders. If PTSD is left untreated, it can adversely affect adolescent well-being and impair cognitive, social and academic abilities. The most commonly used PTSD treatments in adolescents are CBT (cognitive behavioral therapy, EMDR (eye movement, desensitization and information

reprocessing) and also pharmacotherapy, psychoeducation, social and family support. Most people end up in partial or total remission for PTSD at the end of treatment sessions.

Competing interests

The authors declare no competing interests.

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Table 1. The distribution of socio-demographic data and traumatic events

Variable	Number	Percent (%)	Mean ± SD
Gender			
Male	391	44.9	
Female	480	55.1	
Age	871	100	14.98 ± 1.49
Unemployed father	25	2.9	
Mother without a job	729	83.7	
Salary			2.76 ± 1.50
Under 4000dh	443	50.9	
Between 4000 and 8000dh	290	33.3	
More than8000dh	138	15.8	
Tobacco consumption	231	26.5	
Alcohol consumption	25	2.9	
Use of illicit drugs	97	11.1	
Traumatic events			
The sudden and unexpected death of a loved one	241	27.7	
Another very stressful experience	152	17.5	
Accident of the public way	82	9.4	
Date of event			4.51± 1.70
Between 1 monthset 6 months	279	32	
Between 6 months et 1 year	136	15.6	
Between 1 year and 3 years	196	22.5	
More than 3 years	260	29.8	

Dh = Moroccan dirham; SD = Standard Deviation

Table 2. Difference in variables between adolescents without PTSD and adolescents with PTSD and between middle school and high school students

Variable	**PTSD**		**t**	**p**	**School level**		**t**	**p**
	Without PTSD (mean ± SD)	With PTSD (mean ± SD)			Middle school (mean± SD)	High school (mean ± SD)		

Age	15.19 ± 1.50	14.87 ± 1.48	3.09	0.002	14.22 ± 1.35	16.13 ± 0.81	-23.52	<0.001
Salary	2.94 ± 1.54	2.65 ± 1.47	2.70	0.007	2.49 ± 1.40	3.16 ± 1.57	-6.61	<0.001
Frequency of tobacco use	1.37 ± 2.58	1.22 ± 2.44	0.81	0.415	1.26 ± 2.41	1.30 ± 2.61	-0.26	0.792
Frequency of alcohol use	0.04 ± 0.24	0.03 ± 0.19	0.06	0.951	0.03 ± 0.19	0.03 ± 0.23	-0.005	0.996
Frequency of illicit drug use	0.41 ± 1.41	0.50 ± 1.57	-0.90	0.366	0.49 ± 1.54	0.44 ± 1.47	0.42	0.668
Date of event	4.62 ± 1.75	4.45 ± 1.67	1.41	0.156	4.44 ± 1.72	4.62 ± 1.66	-1.57	0.115
CPTS-RI score	9.91 ± 1.05	34.14 ± 12.33	-34.72	<0.001	25.26 ± 14.28	25.62 ± 16.67	-0.33	0.736
STAIY score	46.08 ± 12.34	49.05 ± 13.00	-3.29	0.001	46.38 ± 12.68	50.38 ± 12.72	-4.55	<0.001
CDI score	15.39 ± 7.24	16.90 ± 7.25	-2.96	0.003	15.92 ± 7.22	17.01 ± 7.32	-2.16	0.031
Item 12 of the CPTS-RI	1.14 ± 0.48	2.21 ± 1.37	-13.28	<0.001	1.93 ± 1.28	1.67 ± 1.18	3.08	0.002
Item 14 of the CPTS-RI	0.71 ± 0.45	1.03 ± 1.29	-4.26	<0.001	0.90 ± 1.15	0.93 ± 0.96	-0.27	0.780
Item 15 of the CPTS-RI	0.72 ± 0.55	1.76 ± 1.45	-12.21	<0.001	1.37 ± 1.37	1.42 ± 1.19	-0.54	0.584
Item 15 of the CDI	0.86 ± 0.76	0.90 ± 0.80	-0.74	0.459	0.84 ± 0.81	0.96 ± 0.74	-2.24	0.025
Item 21 of the CDI	0.48 ± 0.66	0.59 ± 0.72	-2.15	0.031	0.57 ± 0.74	0.51 ± 0.65	1.19	0.234

SD = Standard Deviation; t = Student t test; p = significance

Table 3. Difference of variables by sex and by school level and by presence of PTSD

Variable	**p-value (PTSD)**	**p-value (School level)**	**p-value (Gender)**
Gender	<0.001	<0.001	-
Living environment	0.110	<0.001	0.319
Father's job	<0.001	<0.001	0.026

Mother's job	0.063	<0.001	0.373
Illness of the student	0.119	0.899	0.038
Skipping school	0.014	0.051	<0.001
Repeating the class	0.305	0.027	<0.001
Tobacco consumption	0.716	0.005	<0.001
Alcohol consumption	0.395	0.575	<0.001
Use of illicit drugs	0.373	0.135	<0.001
Traumatic event	0.022	<0.001	<0.001
PTSD level	-	<0.001	<0.001
School level	<0.001	-	<0.001

Table 4. The correlation between the different variables

Variable	**r**	**p**
PTSD		
Age	0.04	0.195
Level of concentration	0.42	<0.001
Level of anxiety	0.39	<0.001
Level of depression	0.32	<0.001
Memory difficulties	0.36	<0.001
Completion of homework	0.09	0.008
School results	0.08	0.014
Suicide	0.21	<0.001
Suicide		
Level of anxiety	0.39	<0.001
Level of depression	0.51	<0.001
School results		
Level of anxiety	0.18	<0.001
Level of depression	0.28	<0.001
Frequency of tobacco use		
Frequency of alcohol use	0.33	<0.001
Frequency of illicit drug use	0.66	<0.001
School results	0.07	0.021

r = Pearson's correlation; p = significance