

## Prevalence of Adult Attention Deficit Hyperactivity Disorder (Adult ADHD): Tabriz

Shahrokh Amiri, MD<sup>1</sup>  
 Mohammad Ali Ghoreishizadeh,  
 MD<sup>2</sup>  
 Homayoun Sadeghi-Bazargani,  
 MD, MSc, PhD<sup>3</sup>  
 Mohammad Jonggoo, MD<sup>4</sup>  
 Javad Golmirzaei MD<sup>5</sup>  
 Salman Abdi, MSc<sup>4</sup>  
 Salman Safikhanlo, MSc<sup>4</sup>  
 Abolfazl Asadollahi, MD<sup>4</sup>

1 Clinical Psychiatry Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.

2 Department of Psychiatry, Tabriz University of Medical Sciences, Tabriz, Iran.

3 Road Traffic Injury Research Center, Department of Statistics & Epidemiology, Tabriz University of Medical Sciences, Tabriz, Iran.

4 Tabriz University of Medical Sciences, Tabriz, Iran.

5 Pediatric Neurology Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

### Corresponding author:

Homayoun Sadeghi-Bazargani,  
 Road Traffic Injury Research Center, Department of statistics & Epidemiology, Tabriz University of Medical Sciences, Tabriz, Iran.  
 Tel: +989144027218  
 Fax: +98 4113340308  
 Email:  
 Homayoun.sadeghi@gmail.com

**Objective:** Attention deficit hyperactivity disorder in adults (adult ADHD) is gaining more attention nowadays. Nevertheless, very few studies have addressed this issue in Iran. The present study was conducted to determine the prevalence of adult ADHD in Tabriz, North-West of Iran.

**Methods:** Four hundred urban inhabitants of Tabriz- with an age range of 18 to 45 years were selected through the probability proportional to size cluster sampling in 2009. The screening was performed by Conner's Adult ADHD Rating Scale, and the definite diagnosis of Adult ADHD was performed via clinical interview according to DSM-IV-TR and Wender Utah criteria .

**Results:** The prevalence of adult ADHD was estimated to be 3.8%. Men when compared with women were more likely to have ADHD (5.5 % in men versus 2 % in women). Marital status, birth order, educational level and occupational status showed no significant association with adult ADHD. History of psychiatric treatment, alcohol drinking and smoking had similar relative frequency in subjects with and without adult ADHD.

**Conclusion:** The prevalence of adult ADHD in this region of Iran seems to be substantially higher than expected or treated. This would require more attention to be drawn by health sector managers in order to improve the knowledge of the general population and the knowledge of the health care professionals about the disorder.

**Keywords:** Attention deficit hyperactivity disorder, adulthood, prevalence, epidemiology

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Attention deficit/hyperactivity disorder (ADHD) is a behavioral pattern manifesting in childhood and is a developmental disproportional combination of Attention deficit/hyperactivity and impulsivity. Initially, attention deficit/hyperactivity disorder was known as a childhood behavioral developmental retardation disappearing through adulthood, but several documents have shown that ADHD is persistent through adulthood (1, 2). ADHD has been known as an important adulthood disease with diurnal variations. Diagnostic problems in adults are changing the pattern of symptoms during the time resulting in the difficult evaluation of the disease, and also the symptoms of ADHD may be misdiagnosed with other psychopathologies (3). It is forecasted that the frequency of this disorder would be increased in the future. On the other hand,

previous studies have shown that adults with ADHD would often have different psychiatric and social function problems, (4, 5) such as substance abuse (6, 7), more frequent changes in employment and multiple marriages (7), unemployment (8) and lower career ability (1, 9, 10). Also, ADHD is a heterogeneous disorder accompanying multiple disorders (10, 11, 12).

Epidemiological studies have shown that ADHD is a common disorder seen in 5% to 10% of school-age children. Longitudinal studies have reported that ADHD symptoms would persist through adolescence years in 70% and through adulthood in 50% (3). In a study on 18-44 year old American workers, the prevalence of ADHD was reported to be 4.2% according to DSM-IV. The prevalence rate was 4.9% in men and 3.3% in women. The prevalence rate was 3.4% among those aged between 18 and 29 years and

4.7% among those aged 30 to 44 years. The prevalence of Adult ADHD did not differ across different educational levels and career skills in the workers (9). Another study was performed by WHO to determine the prevalence rate and career effects of Adult ADHD in ten countries. This study showed that 1.3% to 4.9% (3.5% on average) of the workers had Adult ADHD; these subjects had 22 days more missed role performance compared with healthy subjects annually (1). Also, a study in a national American Sample showed that the prevalence rate of Adult ADHD is 4.4% (4).

In a cross-sectional study about the prevalence and correlations of Adult ADHD among 11422 subjects aged 18 to 44 years from ten countries in America, Europe and Middle East, the mean prevalence rate of Adult ADHD was 3.4% (minimally, 1.21 in Spain and 7.32 in France). The prevalence rate was lower in countries with poor economic status (1.9%) compared to those with high economic status (4.2%). The authors concluded that adult ADHD is often accompanied by other DSM-IV disorders and would result in major disability. Only small percentage of patients with ADHD referred to psychiatrists to seek treatment for ADHD symptoms and also those who referred for treatment mainly had emotional and behavioral problems. The authors recommended more attention to adult ADHD studies in epidemiological and clinical issues (13).

The study about the prevalence rate of Adult ADHD may develop basic information in the estimation of the disease burden and essential programs to confront the disease effects. However, there are scarce descriptive data about the prevalence of Adult ADHD. As no previous study has been performed on the prevalence of adult ADHD in Iran and most Middle-East countries, this study was performed to determine the prevalence of ADHD in Tabriz, North-West of Iran, for better development and improvement of the health and treatment management in Iran.

## Material and Methods

This was a descriptive cross-sectional study. The sample population included 18 to 45 year old subjects living in Tabriz, North-West of Iran in 2009. A sample size of 400 subjects was estimated prior to the study according to the Cochrane Formula considering P as 0.04, d as 0.02, and  $\alpha$  as 0.05. A two stage cluster sampling method with a probability proportional to size basis was used. Postal codes were extracted by the cooperation of the East Azerbaijan Provincial Health Center (department) providing an annually updated sampling framework. At the first clustering stage, a presumed 200 households were selected followed by equal sized samples according to gender at the second stage. Then, the researchers evaluated one male and one female subject in each of the selected households through Conner's Adult ADHD Rating Scale (self-

report). In non-cooperating cases, the next postal code was replaced.

The subjects with ADHD index higher than 70 in the self-report questionnaire of Conner's Adult ADHD Rating Scale were initially evaluated for childhood ADHD symptoms; and if positive, the ADHD portion of K-SADS questionnaire about childhood was fulfilled; and if certified by one more family member knowing about his/her childhood, the subject was selected. Then, the psychiatric interview was performed for all selected individuals according to the DSM-IV-TR criteria and Wender Utah; and those who had definite symptoms were diagnosed to have adult ADHD.

### Participants

The participants included 400 population subjects (200 men and 200 women) with an age range of 18 to 45 years living in urban Tabriz, North-West of Iran in 2009. The inclusion criteria were defined as follows: an age range of 18-45, lack of severe mental and somatic disability, willingness and consent to participate in the study .

### Measurement

Conner's Adult ADHD Rating Scale was used for screening the purpose followed by a clinical diagnosis made through psychiatry interview based on DSM-IV. The Conners' Adult ADHD Rating Scale (CAARS) has widely been used to screen and follow up patients; and its validity and reliability are shown to be in accordance with DSM-IV. It has multiple indices including attention deficit index (subscale A), hyperactivity-impulsivity index (subscale B), ADHD total symptoms index (subscale C) and ADHD index (subscale D). Subscale C is the sum of A and B subscales. In the original reference manual of the CAARS, it is clarified that which questions belong to specified subscales; and with adding the scores of each subscale questions, scores of each subscale was determined. This questionnaire can be considered as a standard measure for ADHD research. This questionnaire had been translated to Persian by Clinical Psychiatry Research Center (CPRC) in Tabriz and validated by Amiri et al. The reliability and feasibility of the Persian version of this diagnostic instrument were already determined as fair to good for most diagnostic categories ( $Kappa > 0.6$ ). and has just recently been used by the authors referring also to the previous studies with an overall internal consistency of the Conner's Adult ADHD Rating Scale by Cronbach's alpha being equal to 0.83 (14). In this study, the internal consistency of the scale was also assessed as a measure of reliability by Cronbach's  $\alpha$  being equal to 0.83.

### Statistical Analysis

The obtained data were analyzed by SPSS (version 16). The descriptive statistics including frequency, relative frequency, means and standard deviations were used to depict the current situation of adult ADHD and describe the demographic status of the understudy population. Chi-Square and Fisher's exact tests were

used to determine the association of demographic categorical variables and occurrence of adult ADHD. Independent t-test was used to compare the numeric scale variables such as age of smoking initiation in the two groups (Adult ADHD and normal population). P values less than 0.05 were considered significant. This study was approved by the regional committee of ethics in Tabriz University of medical sciences. The study protocol was approved and publicly defended as a thesis project for a degree of specialty in psychiatry in Tabriz University of medical sciences. All the subjects provided informed consent and patient anonymity was preserved.

## Result

Twenty-two among 400 selected subjects (5.5%) had ADHD index higher than 70 points including six females (27.3%) and 16 males (72.7%). Twenty-one among these 22 subjects were referred for clinical interview. The interview showed that 15 subjects (3.8%) had adult ADHD according to the DSM-IV-TR criteria and Wender Utah. The mean age was  $33.40 \pm 7.67$  and  $32.19 \pm 7.74$  in adult ADHD and normal

subjects. The minimum and maximum ages were 22 and 45 years, respectively. The adult ADHD prevalence in the general population according to the age strata was six (3.2%) in 18-30-year-old subjects, seven (5%) in 31-40-year-old subjects, and two (2.7%) in 41-45-year-old subjects. Also, the prevalence of adult ADHD was 5.5% (11 subjects) in men and 2% (four subjects) in women.

According to the results obtained from Fisher Exact Test, the sex ratio was not different between those with and without Adult ADHD (Table 1). Also, according to the results obtained from Chi-Square Test, the frequency distribution of age, marital status, birth order, educational level and occupational status were not different between subjects with and without Adult ADHD (Table 1). The frequency distribution of history of psychiatric treatment, alcohol drinking, and smoking did not differ between subjects with and without Adult ADHD according to Fisher Exact Test (Table 2).

According to Table 3, the results of the t-Test test showed that the mean age of smoking initiation did not differ between the subjects with and without Adult ADHD. Two subjects were ex-smokers.

**Table 1: Demographic characteristics in normal and attention deficit hyperactivity disorder (ADHD) subjects**

Variables	Groups	Adult ADHD F (%)	Normal F (%)	$\chi^2$	P-Value
Gender	Male	11(5.5)	189 (94.5)	3.39	0.11
	Female	4(2)	196 (98)		
Age group	18-30 years	6(3.2)	180 (96.8)	0.97	0.61
	31-40 years	7(5)	133 (95)		
	41-50 years	2(2.7)	72 (97.3)		
Marital Status	Single	2(2.7)	72 (97.3)	0.36	0.83
	Married	13(4)	311 (96)		
	Divorced	0(0)	2 (100)		
Birth Order	First	3(3.1)	94 (96.9)	1.19	0.55
	Second	11 (4.5)	233 (95.5)		
	Third or upper	1 (1.7)	58 (98.3)		
Education Levels	Junior High school & lower	8 (4.6)	165 (95.4)	2.01	0.36
	Senior High school	6 (4.2)	136 (95.8)		
	Academic	1 (1.2)	84 (98.8)		
Occupation Status	Employed	11 (5.3)	195 (94.7)	3.40	0.18
	Unemployed	0 (0)	31 (100)		
	Housekeeper	4 (2.5)	159 (97.5)		

**Table 2: Psychiatric treatment, alcohol drinking, and smoking in normal and attention deficit hyperactivity disorder (ADHD) subjects**

Variables	Group	Adult ADHD F (%)	Normal F (%)	Fisher exact test	P-Value
History of psychiatric treatment	Yes	Zero	10 (100)	0.40	1.000
	No	15(2.6)	175 (97.4)		
Smoking	Yes	4(6)	63 (94)	1.09	0.29
	No	11(3.3)	322 (96.7)		
Alcohol drinking	Yes	1(7.1)	13 (92.9)	0.46	0.42
	No	14(3.6)	372 (96.4)		

**Table 3: Age of smoking initiation in normal and attention deficit hyperactivity disorder (ADHD) subjects**

Variables	Groups	N	Mean (SD)	t	df	P-Value
Age of smoking initiation	ADHD	6	23.17 (4.30)	0.42	70	0.67
	Normal	66	22.09 (5.97)			

## Discussion

This study which was conducted to determine the prevalence of adult ADHD in Tabriz showed that 3.8% among 400 participants aged 18 to 45 years had ADHD which was determined according to DSM-IV-TR criteria and Wender Utah. This prevalence is similar to that of western countries. In the National Comorbidity Survey Replication, 4.4% of 3199 subjects aged 18 to 44 years met the DSM-IV criteria for ADHD (8). In another report, the prevalence rate of 3.4% was reported among 18 to 44 year old subjects (13). Also, in a study conducted on outpatients with non-psychotic psychiatric illnesses, the prevalence of ADHD was 16.8% and it was 5.3% among healthy participant (15). In a study conducted in Hungary among 3529 adults aged 18 to 60 years, adult ADHD was more common in men and in adults younger than 40 years of age. The prevalence was 2.3% in males and 0.91% in females; 2.02% in the  $\leq 40$  year old group and 0.70% in the  $>40$  year old group based on DSM-IV diagnostic criteria (16).

Similar prevalence of adult ADHD in western countries and Iran demonstrates the weak effect of sociocultural factors in this disorder. In a study it was showed that the heritability of ADHD in adults is estimated around 30% in men and women. There is some evidence for assortative mating. All familial transmission is explained by genetic inheritance; there is no support for the hypothesis that cultural transmission from parents to offspring is important (17). This prevalence rate of adult ADHD requires designing and managing general health.

In different studies, the prevalence of ADHD in boys has been reported to be more than girls (18, 19, 20). Nonetheless, as the results of our study indicate, gender has a weak impact on adult ADHD as well as non-significant prevalence in men (5.5% vs. 2% percent). This is similar to the reports of previous studies (9, 11). However, some studies have reported higher prevalence among men (8, 13).

According to our findings, the prevalence of adult ADHD was not different in the age strata, which is similar to the reports of some other studies (1, 9) and opposite to some others (13). One study had reported higher prevalence of ADHD in lower ages (11).

In some studies, the prevalence of adult ADHD was not reported to differ according to marital status (1, 13) as in our study (1, 13), but some others have reported significantly higher prevalence among divorced or previously married patients (7, 8, 21). Another study showed a higher prevalence of adult ADHD in widowed/divorced/ separated and single patients (11). However, due to the effect of adult ADHD on intimate relationships leading to less stability and higher divorce rate, the judgment about the effect of this disorder on marital status may need longer follow ups.

The lack of association between adult ADHD and educational level was similar to some studies (1, 9) and

opposite to some others showing higher prevalence of adult ADHD in illiterate subjects or those with low literacy (11, 13 and 21).

Employment status was not associated with the prevalence of adult ADHD, but in previous studies unemployed subjects have had higher prevalence of adult ADHD (8, 11, 21). Also, a study on workers has shown lower prevalence of adult ADHD among expert workers (1).

Previous studies did not evaluate the association of adult ADHD and birth order; the results obtained in our study showed no association in this aspect. This may be explained by the fact that when a person enters adulthood and integrates with the public, the effect of birth order will be diminished despite its initial effect on personality development in childhood. This might highlight the role of social life environment in personality development as well.

However, in previous studies, patients with adult ADHD sought treatment less than the normal adults (8, 13), but in our study the number of psychiatrist visits was similar between normal and adult ADHD subjects. This may be due to different factors such as poor insight, psychiatric disorders stigma, or lack of access to treatment. However, the findings of this study highlighted the importance of increasing our knowledge about the general population. Further, health sector managers should pay more attention to adult ADHD. Also, it is suggested that the contributing factors for lack of treatment seeking among adult ADHD patients be evaluated in the future studies.

Another part of our study showed the self-report of alcohol use and smoking and revealed that the mean age of smoking initiation was not different between the subjects with and without Adult ADHD. This finding is the opposite of those findings reported by previous studies about smoking (22) and alcohol use (23, 24), which showed the substance abuse as the outcome and comorbidity of ADHD. With respect to the association of smoking and substance use with adult ADHD, it may be noted that this is a type of self-administration treatment for ADHD (25, 26). In our study, few normal and adult ADHD subjects were reported to use alcohol, and this may be due to the fact that alcohol use is illegal and stigmatic in Iran. Since the self-report of alcohol and substance use in Islamic countries, would bias the results and regarding small sample size and type of questions, it may not be judged.

However, in our study, the sample size was calculated to be 400, but the 3.8% prevalence rate of adult ADHD is required to be replicated with a larger sample population to increase the reliability of the correlational analysis.

Limitations: The main limitation of this study was its moderate sample size allowing for 2% precision. However, the results are yielding considering it to be among the first prevalence studies conducted in Iran about adult ADHD.

## Conclusion

The prevalence of adult ADHD in Tabriz (with one million and three-hundred thousand population) residents aged 18 to 45 years was 3.8% (5.5% in men and 2% in women) according to DSM-IV-TR criteria and Wender Utah. The prevalence of ADHD was not associated with age, marital status, birth order, educational level, career status, alcohol use and smoking.

However, other studies have reported the effect of psychosocial factors on the prevalence of adult ADHD (8, 11, 21), but it was not observed in our study. Our findings about the contributions of adult ADHD were important in some aspects; these findings may be due to Iranian sociocultural effect, and also research factors such as inclusion criteria and sample size. Performing complementary studies about the contributors of adult ADHD and psychiatric comorbidities in Iran and the other Middle East countries would result in more definite recognition of psychosocial contributors of adult ADHD.

Considering the high prevalence of ADHD in adults and the importance of on time diagnosis and treatment of this disorder, further studies are needed to determine the definite prevalence in the whole country. Since many patients are hidden cases receiving no treatment and may develop side effects of the disease in their life, providing information for the public and exclusive training for the professionals are needed in this field. More special trainings for general practitioners to diagnose and refer the patients for treatment would decrease the under-treatment cases. Furthermore, early prognosis and treatment of patients may decrease burden of disease, such as costs due to accidents, substance abuse, career and education leave and other problems.

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## Conflict of Interests

There is no conflict of interests.

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