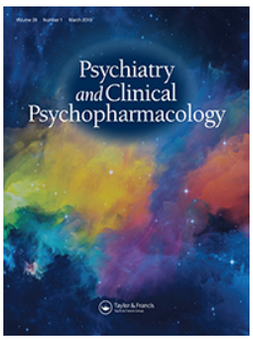

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Prevalence of adult attention deficit hyperactivity disorder and comorbid axis-I disorders among first time applied cases of a general psychiatry outpatient clinic and a private psychotherapy centre

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ABSTRACT

OBJECTIVES: The primary objective of this study was to identify the prevalence of adult attention deficit hyperactivity disorder (ADHD) among first time applied consecutive cases of a university hospital general psychiatry outpatient clinic (OC) and a private psychotherapy centre (PPC). The secondary aim of this study was to define the causes of application to these centres and prevalence of comorbid axis-I disorders in adult ADHD cases.

METHODS: This study was a descriptive epidemiological study conducted in OC of Ege University Faculty of Medicine and Private Psikoaktif Psychotherapy Center. At each center, all the first time applied consecutive cases were approached. Adult ADHD Self-Report Scale (ASRS-v1.1) and Turgay's Adult ADD/ADHD DSM-IV Based Diagnostic Screening and Rating Scale were used as screening tests and Wender Utah Rating Scale (WURS) was used to evaluate childhood ADHD symptoms. Diagnostic Interview for ADHD in Adults (DIVA 2.0) was applied to positively screened cases and DSM-5 criteria were taken into consideration in diagnostic interviews. Patients who were diagnosed with adult ADHD via DIVA 2.0 were evaluated by Structured Clinical Interview for DSM-IV Axis-I Disorders (SCID-I).

RESULTS: The prevalence of adult ADHD according to DSM-5 criteria in OC including 210 individuals was 14.3% ($n = 30$). The prevalence of adult ADHD in PPC including 133 individuals was 9.8% ($n = 13$). The most common type of comorbid psychiatric disorders among ADHD diagnosed patients of OC and PPC were depressive disorders (40.0% vs 46.1%). 80.0% of ADHD patients in OC were diagnosed with at least one additional psychiatric disorder and 46.7% were diagnosed with more than one additional psychiatric disorder; it was 84.6% and 30.8% for PPC, respectively. Only 30.0% of patients with ADHD in OC and only 15.4% of patients with ADHD in PPC were applied suspecting they had an ADHD. When we look at their causes of applications, it is seen that patients with ADHD in PPC reported more marriage/relationship problems (84.6% vs 49.5%) ($p = 0.037$), personal problems (53.8% vs 14.7%) ($p = 0.003$), and educational problems (46.2% vs 9.5%) ($p = 0.003$) than patients without ADHD. In OC, there was no statistically significant difference between ADHD and non-ADHD patients in terms of causes of application.

CONCLUSIONS: In this study, we found the prevalence of adult ADHD in OC and PPC much higher than estimates for the general adult population. Almost all adult ADHD patients of both centres had at least one additional psychiatric disorder. Adult ADHD patients who have marriage/relationship, personal, and educational problems preferred applying to a PPC expecting a treatment method other than pharmacotherapy. To our knowledge, this is the first study to evaluate the prevalence of adult ADHD, their clinical presentation, and causes of application in a group expecting treatment method other than pharmacotherapy. However, further studies in other mental health centres with larger sample sizes are needed to improve the knowledge and experience in this field.

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Adult attention deficit hyperactivity disorder; prevalence; comorbidity; psychiatry outpatient clinic; psychotherapy centre

Introduction

According to the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5), attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by persisting inattention and/or hyperactivity-impulsivity that interferes with functioning or development [1].

ADHD is a childhood-onset disorder which may persist into adulthood; long-term follow-up studies revealed that in 40–60% of children the disorder persists into adulthood [2–6]. The prevalence of adult ADHD in general population is found between 2.5% and 4.4% in large sample sized epidemiological studies [7–9]. The clinical presentation of ADHD in adults is different than in children [10] and it is not described well; so, this may decrease the prevalence estimates of ADHD in adults [11]. For instance, in the transition from childhood to adulthood, the diminishing

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symptoms of hyperactivity may be manifested as restlessness; whereas the persisting symptoms of inattention may be manifested as difficulties in carrying out tasks [2]. In the view of clinical studies, some of the diagnostic criteria of ADHD are revised in DSM-5 and made appropriate for adults.

It is known that only 25% of adult ADHD patients were diagnosed during their childhood or adolescence [12]. In fact, some adults with ADHD are referred to clinicians for the first time after their children have been diagnosed with ADHD [13]. Therefore, ADHD may currently be considered an underdiagnosed and undertreated disorder in adults [14].

Consequences of ADHD in adulthood include employment and financial difficulties (e.g. frequent job changes, unemployment, and lower socioeconomic status, interpersonal problems such as social maladjustment and marital problems) [2] and adult ADHD patients are mostly admitted to psychiatry clinics with comorbid psychiatric disorders such as depressive, anxiety, and substance use disorders [15]. Being aware of the clinical presentation, prevalence and comorbid psychiatric disorders of adult ADHD could help clinicians take this disorder into consideration.

Although ADHD in adult population is a more recognized phenomenon, the prevalence of ADHD in psychotherapy clinics is not studied at all. Taking its various presentations to mental health services into consideration, authors of this study aimed to explore the population asking for help at psychotherapy clinics. The primary objective of this study was to identify the prevalence of adult ADHD among first time applied consecutive cases of a university hospital general psychiatry outpatient clinic (OC) and a private psychotherapy centre (PPC). The secondary aim of the study was to define the causes of applications to these centres and prevalence of comorbid axis-I disorders in adult ADHD cases.

Method

Sample

This study was a descriptive epidemiological study conducted in general psychiatry OC of Ege University Faculty of Medicine and Private Psikoaktif Psychotherapy Center. Two psychologists and a family counsellor working in PPC and besides family counselling, they are doing some psychosocial interventions like personal and couples therapy. When we examine the website of this centre, which is a reference for the applicants, it can be said that they are applying here to get a psychological support other than a pharmacotherapy.

At each centre, all the first time applied consecutive cases were approached. Inclusion criteria were (1) having signed an informed consent to release information prior to any procedure; (2) being at the age of 18 or older; and (3) having a reading comprehension skill and education level to fill out the scales. Exclusion criteria were (1) having a clinically prominent mental retardation; (2) having a physical, neurological, or cognitive disorder to an extent that prevents the patient from reliably following procedures; and (3) having applied for a medical board report of disability. Cases applied to OC for a medical board report of disability are accepted two days in a week. Some of these cases thought to have a tendency to exaggerate their symptoms resulted in exclusion of them from this study.

The study was approved by Ege University Local Ethics Committee. All applicants had written informed consent and all personal information from the applicants is anonymized when used for research purposes.

Procedures

After having provided written informed consent of the cases which does not meet any exclusion criteria before clinical assessment were given Adult ADHD Self-Report Scale (ASRS-v1.1) [16], Turgay's Adult ADD/ADHD DSM-IV Based Diagnostic Screening and Rating Scale [17], Wender Utah Rating Scale (WURS) [18], and the case report form used in this study. Positively screened cases according to ASRS (at least four out of six responses exceeding threshold in Part A) or Turgay's Adult ADD/ADHD DSM-IV Based Diagnostic Screening and Rating Scale (at least five out of nine responses exceeding threshold in Part 1 or 2) were clinically assessed in OC. Positively screened cases of PPC according to at least one of these screening tests were invited to Ege University Faculty of Medicine via telephone for a clinical assessment. In this study, two different screening tests were used to increase sensitivity. Diagnostic Interview for ADHD in Adults (DIVA 2.0) [19] was applied to positively screened cases and DSM-5 criteria were taken into consideration in this diagnostic interview. Whenever possible, the DIVA 2.0 was completed with the patient's first-degree relatives to enable retrospective and collateral information; information received via telephone was also accepted. Patients who were diagnosed with adult ADHD via DIVA 2.0 were evaluated by Structured Clinical Interview for DSM-IV Axis-I Disorders (SCID-I) [20]. WURS was used to evaluate childhood ADHD symptoms and cut-off score was determined as 36 or higher in this study [18]. These interviews were completed approximately in 2 h in a single session.

Materials

Case report form

A questionnaire developed for this study by the authors to determine the sociodemographic characteristics of

the participants. Clinical presentations of the participants such as history of grade repetition, disciplinary penalty at school, job change, problem with police unit, judicial problem, traffic accident, occupational/home accident, suicide attempt, childhood diagnosis of ADHD, previous contact with psychiatry clinics and their causes of applications were also asked in this questionnaire.

Adult ADHD Self-Report Scale (ASRS-v1.1)

The ASRS is an 18-item self-report symptom checklist developed by the World Health Organization (WHO) based on DSM-IV criteria. Six of the eighteen items, found to be the most predictive of ADHD, form part A and at least four out of six responses exceeding threshold were accepted as positively screened according to the ASRS. Validity and reliability studies of the Turkish version of the ASRS-v1.1 have been performed by Dogan et al. [16].

Turgay's Adult ADD/ADHD DSM-IV Based Diagnostic Screening and Rating Scale

It is a self-rating scale developed by Turgay A in Canada based on DSM-IV and consisted of three sub-scales. Parts 1 and 2 each include nine questions of DSM-IV Criterion A attention deficit and hyperactivity/impulsivity symptoms of ADHD, respectively, and at least five out of nine responses exceeding threshold in Part 1 or 2 were accepted as positively screened compatible with recent changes in DSM-5. Part 3 is consisted of 30 items questioning ADHD-associated emotional and behavioural symptoms and gives an idea about the severity of ADHD. Validity and reliability studies of this scale in Turkish population have been conducted by Gunay et al. [17].

Wender Utah Rating Scale

The WURS is a 25-item self-report questionnaire for the retrospective assessment of childhood ADHD symptoms and higher scores indicate greater symptoms. Validity and reliability studies of the Turkish version of the WURS for ADHD in adults have been performed by Oncu et al. [18] and the cut-off score for Turkish population was determined as 36 or higher in this study.

Diagnostic Interview for ADHD in Adults (DIVA 2.0)

The DIVA was developed by Kooij JJS and Francken MH in 2007 and revised in 2010 (DIVA 2.0). It is a semi-structured diagnostic interview covering the childhood and adulthood DSM symptom list for ADHD, and providing examples of impairments commonly associated with the symptoms in five areas of everyday life for each age group: work and education; relationships and family life; social contacts; free time and hobbies; self-confidence and self-image [19,21]. It was first developed in Dutch and now available in many languages including Turkish, but at the time of this article there had not been any validity and reliability study of its Turkish version.

Structured Clinical Interview for DSM-IV Axis-I Disorders

The SCID-I is a semi-structured clinical interview tool that examines axis-I psychiatric disorders according to DSM-IV which is completed by trained interviewers. This instrument is widely used in clinical practice and for research purposes all over the world. The validity and reliability of its Turkish version have been performed by Ozkurkcugil et al. [20].

Statistical analysis

"Pearson chi square" and "Fisher's exact chi square" tests were used for categorical variables and "Kolmogorov–Smirnov" test was used in assessing the distribution of numeric variables. The distribution of data was not found normal, so "Mann Whitney *U*" test was used for binary comparisons of independent groups. Categorical variables were shown as "%" and number of case "*n*"; numeric variables were shown as "mean ± standard deviation" and "median." Statistical significance was evaluated by using two-sided tests with an alpha level of 0.05. All statistical analyses were conducted using SPSS version 18.0.

Results

Patient disposition and sociodemographic characteristics

Three hundred twenty-eight first time applied consecutive cases of Ege University Faculty of Medicine, General Psychiatry OC between 14 January 2015 and 5 March 2015 were the target population of this study for this group and 210 (64.0%) were included. Reasons for ineligibility in OC are listed in Figure 1. 59.5% (n = 125) of the participants were women, 40.5% (n = 85) men, and mean age was 34.07 ± 13.55 (median: 30).

Two hundred twenty first time applied consecutive cases of Private Psikoaktif Psychotherapy Center between 24 March 2015 and 24 December 2015 were the target population of this study for this group and 133 (60.5%) were included. Reasons for ineligibility in PPC are listed in Figure 2. 57.9% (n = 77) of the participants were women, 42.1% (n = 56) men, and mean age was 33.72 ± 8.78 (median: 32). There was no statistically significant difference in terms of mean age (z = 1.222; p = 0.222) and gender distribution (χ^2 = 0.089; p = 0.765) between two groups. Even though it is statistically uninterpretable because of a limited sample size, it is seen that single cases (43.3% vs

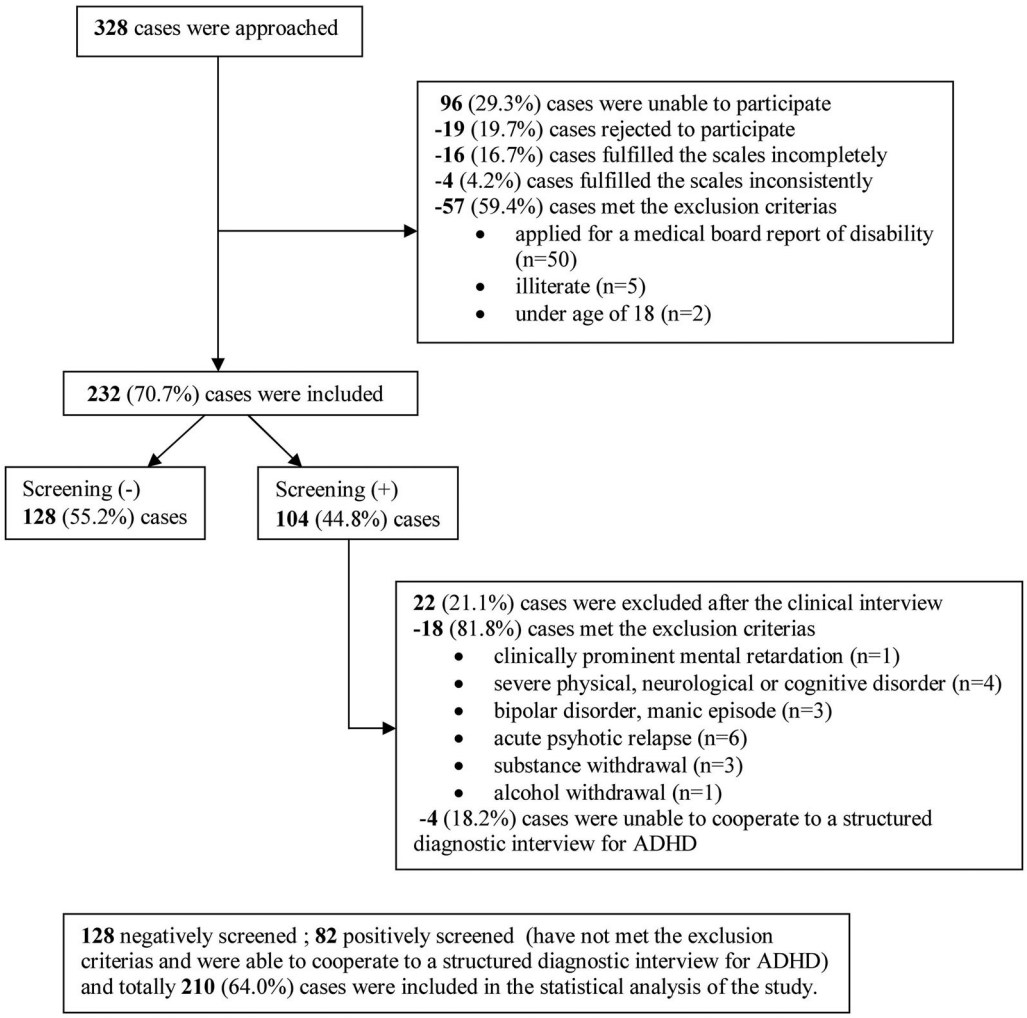

Figure 1. Reasons for ineligibility in OC population.

25.6%) were higher in OC population and married cases (67.7% vs 47.1%) were higher in PPC.

Prevalence of ADHD and comorbid psychiatric disorders

According to DSM-5 criteria, the prevalence of adult ADHD in OC including 210 individuals was 14.3% ($n = 30$) and the prevalence of adult ADHD in PPC including 133 individuals was 9.8% ($n = 13$). ADHD diagnosed individuals (28.13 ± 9.91) were younger compared to non-ADHD individuals (35.06 ± 13.84) in OC group ($z = -2.552$; $p < 0.011$). 63.3% ($n = 19$) of ADHD diagnosed individuals were male and 36.7% ($n = 11$) female but this distribution was 63.3% ($n = 114$) female and 36.7% ($n = 66$) male among non-ADHD individuals and the difference was statistically significant ($\chi^2 = 7.590$; $p = 0.011$). Even though it is statistically uninterpretable because of a limited sample size, percentage of being single is higher among ADHD diagnosed individuals compared to non-ADHD ones (66.7% vs 39.4%) and also unemployment is higher among ADHD cases of OC (20.0% vs 6.1%).

When we look at the PPC population, it is seen that ADHD diagnosed individuals (29.15 ± 4.98) were also younger in this group compared to non-ADHD individuals (35.05 ± 9.07) ($z = -2.293$; $p = 0.022$). There was no statistically significant difference in terms of gender distribution ($\chi^2 = 1.051$; $p = 0.469$). Percentage of being single is again higher among ADHD diagnosed individuals compared to non-ADHD ones (38.5% vs 18.0%). Table 1 shows the detailed comparison of the sociodemographic characteristics of ADHD and non-ADHD participants in OC and PPC population.

Based on SCID-I, the most common type of comorbid psychiatric disorders among ADHD diagnosed patients of OC were depressive disorder (40%), specific phobia (26.7%), alcohol abuse (16.7%), dysthymic disorder (16.7%) and obsessive-compulsive disorder (13.4%), respectively. The most common type of comorbid psychiatric disorders among ADHD diagnosed patients of PPC were depressive disorder (46.1%) and alcohol abuse (23.1%). Table 2 shows the distribution of comorbid psychiatric disorders among patients of adult ADHD for both groups. 80.0% of ADHD patients in OC were diagnosed with at least one additional

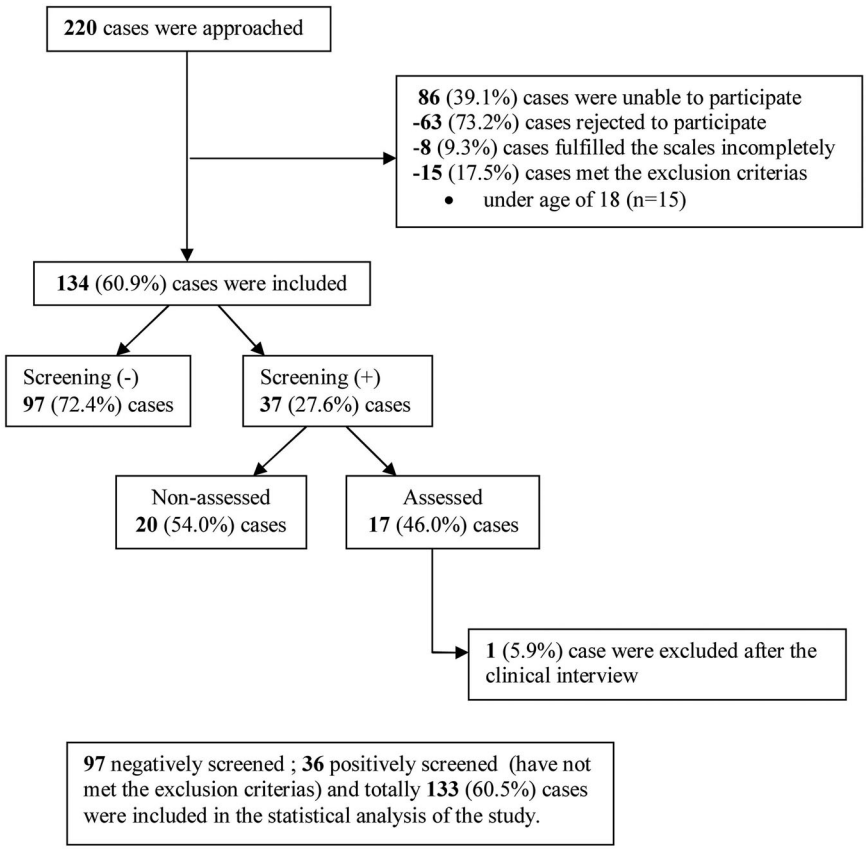

Figure 2. Reasons for ineligibility in PPC population.

psychiatric disorder and 46.7% were diagnosed with more than one additional psychiatric disorder; it was 84.6% and 30.8% for PPC, respectively. ADHD diagnosed patients of OC had higher ASRS ($z = -2.345$; $p = 0.019$) and Turgay's Adult ADD/ADHD DSM-IV Based Diagnostic Screening and Rating Scale Part-3 (Part of problems and features of ADHD) ($z = -2.461$; $p = 0.014$) scores compared to ADHD diagnosed patients of PPC; WURS scores were also higher but it did not reach statistical significance ($z = -1.045$; $p = 0.296$). Comparison of the ADHD assessment scales of ADHD diagnosed patients is shown in Table 3.

Table 1. Comparison of the sociodemographic characteristics of ADHD and non-ADHD participants in OC and PPC population.

	OC				PPC			
	ADHD ($n = 30$)	Non-ADHD ($n = 180$)	Z/χ^2	p	ADHD ($n = 13$)	Non-ADHD ($n = 100$)	Z/χ^2	p
Age (mean ± SD)	28.13 ± 9.91	35.06 ± 13.84	−2.552	**0.011***	29.15 ± 4.98	35.05 ± 9.07	−2.293	**0.022***
Gender								
Female	11 (36.7%)	114 (63.3%)	7.590	**0.011***	6 (46.2%)	61 (61.0%)	1.051	0.469
Male	19 (63.3%)	66 (36.7%)			7 (53.8%)	39 (39.0%)		
Marital status								
Single	20 (66.7%)	71 (39.4%)	N/A	N/A	5 (38.5%)	18 (18.0%)	N/A	N/A
Married	8 (26.7%)	91 (50.6%)			8 (61.5%)	74 (74.0%)		
Divorced	2 (6.7%)	13 (7.2%)			0	8 (8.0%)		
Widow	0	5 (2.8%)			0	0		
Level of education								
Literate	0	5 (2.8%)	N/A	N/A	0	1 (1.0%)	N/A	N/A
Elementary school	3 (10.0%)	34 (18.9%)			0	3 (3.0%)		
Middle school	2 (6.7%)	16 (8.9%)			1 (7.7%)	7 (7.0%)		
High school	7 (23.3%)	48 (26.7%)			3 (23.1%)	30 (30.0%)		
University	18 (60.0%)	77 (42.8%)			9 (69.2%)	59 (59.0%)		
Occupational status								
Housewife	0	40 (22.2%)	N/A	N/A	0	21 (21.2%)	N/A	N/A
Officer	2 (6.7%)	13 (7.2%)			4 (30.8%)	19 (19.2%)		
Worker	6 (20.0%)	25 (13.9%)			3 (23.1%)	12 (12.1%)		
Self-employment	3 (10.0%)	12 (6.7%)			3 (23.1%)	17 (17.2%)		
Student	9 (30.0%)	41 (22.8%)			2 (15.4%)	4 (4.1%)		
Pensioner	1 (3.3%)	25 (13.9%)			0	6 (6.1%)		
Unemployed	6 (20.0%)	11 (6.1%)			0	5 (5.1%)		
Other	3 (10.0%)	13 (7.2%)			1 (7.7%)	15 (15.2%)		

Note: OC: outpatient clinic; PPC: private psychotherapy centre; SD: standard deviation; *n*: number of individuals; N/A: not applicable. *$p < 0.05$.

Table 2. Comorbid psychiatric disorders among patients with ADHD.

	OC ($n = 30$)	PPC ($n = 13$)
Mood disorders	19 (63.3%)	8 (61.5%)
Depressive disorder	12 (40.0%)	6 (46.1%)
Dysthymic disorder	5 (16.7%)	1 (7.7%)
Bipolar disorder	3 (10.0%)	1 (7.7%)
Anxiety disorders	12 (40.0%)	2 (15.4%)
Specific phobia	8 (26.7%)	1 (7.7%)
Social phobia	3 (10.0%)	0
Generalised anxiety disorder	2 (6.7%)	1 (7.7%)
Agoraphobia	1 (3.3%)	0
Alcohol substance-related disorders	11 (36.3%)	4 (30.7%)
Alcohol abuse	5 (16.7%)	3 (23.1%)
Alcohol dependence	1 (3.3%)	1 (7.7%)
Substance abuse	3 (10.0%)	0
Substance dependence	2 (6.7%)	0
Obsessive-compulsive disorder	4 (13.4%)	0
Bulimia Nervosa	1 (3.3%)	1 (7.7%)

Note: OC: outpatient clinic; PPC: private psychotherapy centre; *n*: number of individuals.

Clinical presentation and causes of application in patients of adult ADHD

ADHD diagnosed patients of OC reported more disciplinary penalty at school ($\chi^2 = 9.210$; $p = 0.011$), frequent job change ($\chi^2 = 11.989$; $p = 0.002$), problem with police unit ($\chi^2 = 8.68$; $p = 0.009$), and occupational/home accident ($\chi^2 = 5.501$; $p = 0.028$) than non-ADHD patients and ADHD diagnosed patients of PPC reported more disciplinary penalty at school ($\chi^2 = 18.423$; $p = 0.001$), problem with police unit ($\chi^2 = 11.997$; $p = 0.005$), and judicial problem ($\chi^2 = 5.466$; $p = 0.035$) than non-ADHD patients. Patients with ADHD in OC ($\chi^2 = 1.776$; $p = 0.180$) and PPC ($\chi^2 = 3.263$; $p = 0.090$) reported more suicide attempts than non-ADHD patients, but it did not reach statistical significance. Table 4 shows the comparison of the clinical presentations of ADHD and non-ADHD participants in OC and PPC population.

16.7% of patients with adult ADHD in OC and 30.8% of patients with adult ADHD in PPC have been diagnosed with ADHD in childhood. Only 30.0% of patients with ADHD in OC and only 15.4% of patients with ADHD in PPC were applied suspecting they had an ADHD. When we look at their causes of application, it is seen that patients with ADHD in PPC reported more marriage/relationship problems (84.6% vs 49.5%) ($\chi^2 = 5.680$; $p = 0.037$), personal problems (53.8% vs 14.7%) ($\chi^2 = 11.166$; $p = 0.003$), and educational problems (46.2% vs 9.5%) ($\chi^2 = 12.864$; $p = 0.003$) than patients without ADHD; also reported more occupational problems (30.8% vs 10.5%) ($\chi^2 = 4.153$; $p = 0.064$) but it did not reach statistical significance. In OC, there was no statistically significant difference between ADHD and non-ADHD patients in terms of causes of application.

Table 3. Comparison of the ADHD assessment scales of ADHD diagnosed patients.

	OC (mean ± SD)	PPC (mean ± SD)	*Z*	*p*
ASRS-AB	63.93 ± 8.92	57.31 ± 5.96	−2.345	**0.019***
Turgay-1+Turgay-2	30.57 ± 8.55	25.23 ± 6.73	−1.736	0.083
Turgay-3	55.80 ± 10.74	45.69 ± 13.33	−2.461	**0.014***
WURS	51.57 ± 17.92	45.54 ± 22.42	−1.045	0.296

Note: OC: outpatient clinic; PPC: private psychotherapy centre; SD: standard deviation; ASRS-AB: Adult ADHD Self-Report Scale Part A and B; Turgay-1 +Turgay-2: Turgay's Adult ADD/ADHD DSM-IV Based Diagnostic Screening and Rating Scale Part 1 (inattention)+Part 2 (hyperactivity/impulsivity); Turgay-3: Turgay's Adult ADD/ADHD DSM-IV Based Diagnostic Screening and Rating Scale Part 3 (issues questioning ADHD-associated emotional and behavioural symptoms); WURS: Wender Utah Rating Scale. *$p < 0.05$.

Clinically non-assessed positively screened cases of PPC

Fifty-four per cent ($n = 20$) of positively screened cases of PPC did not accept the invitation to hospital which is done with the aim of further clinical assessment. These cases were not able to evaluate in terms of adult ADHD diagnosis; therefore, they were not included in statistical analysis in comparison of ADHD and non-ADHD patients but this non-assessed group needed to examine closer because of its high percentage like 54%. There was no difference between 16 (46%) clinically assessed and 20 (54%) non-assessed cases with regard to their sociodemographic data such as age ($z = -0.112$; $p = 0.911$), sex ($\chi^2 = 0.000$; $p = 1.000$), marital status, level of education, occupational status and level of income.

When we look at their clinical presentation and causes of application, it is seen that clinically assessed and non-assessed positively screened cases did not show any statistically significant difference. ASRS ($z = -5.268$; $p = 0.886$), Turgay's Adult ADD/ADHD DSM-IV Based Diagnostic Screening and Rating Scale Part-3 (Part of problems and features of ADHD) ($z = -4.398$; $p = 0.786$), and WURS ($z = -4.459$; $p = 0.407$) scores were also not different between assessed and non-assessed cases of PPC. In the light of these data, it can be said that there is a high possibility of having some other ADHD patients among clinically non-assessed cases of PPC.

Discussion

Studies exploring the prevalence of adult ADHD were mostly community based to date and studies exploring the clinical prevalence of adult ADHD are restricted. In this study, the prevalence of adult ADHD among first time applied consecutive cases of a university hospital general psychiatry OC and a PPC were investigated separately. To our knowledge, this is the first study to evaluate the prevalence of adult ADHD, comorbid disorders, their clinical presentation, and causes of application in a group (PPC) expecting treatment method other than pharmacotherapy.

Table 4. Comparison of the clinical presentations of ADHD and non-ADHD participants in OC and PPC population.

		OC				PPC			
		ADHD ($n = 30$)	Non-ADHD ($n = 180$)	χ^2	p	ADHD ($n = 13$)	Non-ADHD ($n = 100$)	χ^2	p
Grade repetition	Yes	7 (23.3%)	24 (13.3%)	2.044	0.167	3 (23.1%)	21 (22.6%)	0.002	0.968
	No	23 (76.7%)	156 (86.7%)			10 (76.9%)	72 (77.4%)		
Disciplinary penalty at school	Yes	5 (16.7%)	6 (3.3%)	9.210	**0.011***	5 (38.5%)	4 (4.1%)	18.423	**0.001***
	No	25 (83.3%)	174 (96.7%)			8 (61.5%)	95 (95.9%)		
Job change	Never	15 (50.0%)	133 (73.9%)	11.989	**0.002***	8 (61.5%)	60 (72.3%)	N/A	N/A
	Rare	10 (33.3%)	41 (22.8%)			3 (23.1%)	18 (21.7%)		
	Frequent	5 (16.7%)	6 (3.3%)			2 (15.4%)	5 (6.0%)		
Problem with police unit	Yes	7 (23.3%)	12 (6.7%)	8.680	**0.009***	5 (38.5%)	7 (7.0%)	11.997	**0.005***
	No	23 (76.7%)	168 (93.3%)			8 (61.5%)	93 (93.0%)		
Judicial problem	Yes	7 (23.3%)	25 (13.9%)	1.776	0.180	5 (38.5%)	13 (13.1%)	5.466	**0.035***
	No	23 (76.7%)	155 (86.1%)			8 (61.5%)	86 (86.9%)		
Traffic accident	Yes	9 (30.0%)	31 (17.2%)	2.723	0.162	9 (69.2%)	44 (44.0%)	2.941	0.156
	No	21 (70.0%)	149 (82.8%)			4 (30.8%)	56 (56.0%)		
Occupational/ home accident	Yes	7 (23.3%)	16 (8.9%)	5.501	**0.028***	2 (15.4%)	11 (11.3%)	0.180	0.650
	No	23 (76.7%)	164 (91.1%)			11 (84.6%)	86 (88.7%)		
Suicide attempt	Yes	9 (30.0%)	31 (17.2%)	2.723	0.162	4 (30.8%)	12 (12.1%)	3.263	0.090
	No	21 (70.0%)	149 (82.8%)			9 (69.2%)	87 (87.9%)		

Note: OC: outpatient clinic; PPC: private psychotherapy centre; n: number of individuals; N/A: not applicable. *$p < 0.05$.

In our study, based on DIVA (using DSM-5 criteria) we found adult ADHD prevalence of 14.3% in OC population. The prevalence of adult ADHD in the general adult population was found between 2.5% and 4.4% in large sample sized epidemiological studies [7–9]. As we hypothesized, this value is much higher than for the general adult population and the power of our study was calculated as 99.8% in OC group. One of a few clinically based population studies was Deberdt et al. [21] study which was published when we were accepting patients for our study. Adult ADHD diagnosis was also based on DIVA (using DSM-5 criteria) in this large sample sized ($n = 1986$) multi-national study and found a prevalence of 17.4%. Almeida Montes et al. [22] found a prevalence of 16.8% in non-psychotic outpatients. We can say that our results agree well with these studies [21,22]. Nylander et al. [23] and Rao and Place [24] found a prevalence of 22% and it is higher than our estimate of prevalence.

In this study, based on DIVA (using DSM-5 criteria) we found adult ADHD prevalence of 9.8% in PPC population. As we also hypothesized, this value is much higher than for the general adult population. However, the power of our study was calculated as 77.1% for PPC group in which we were not able to reach a targeted number of case. Attention should be paid that only 46% of positively screened cases for ADHD were able to be referred to hospital and clinically assessed in this group. The remained 54% of positively screened, clinically non-assessed cases were asked about reasons of refusing apply to the hospital for a clinical assessment. Some of them replied that they had preferred applying to a PPC and see a psychologist rather than a psychiatrist with thoughts of avoiding drugs. They had a prejudice on psychiatrists that they would definitely prescribe drugs and that drugs would cause a dependence, make them lethargic. In a review [25] examining how adolescent and adult ADHD patient beliefs impact pharmacological treatment adherence, similar thoughts on drugs are stated in non-adherent cases. Some others stated that if they use drugs the other family members would act them as a problematic member and use this against so we can say that they had a fear of being stigmatized. Some other cases of PPC applying with marriage/ relationship, personal, educational, and occupational problems rejected to fulfil the ADHD scales. They stated that given scales were not related to their complaints. It is seen that persisting childhood ADHD symptoms like restlessness, impatience, emotional fluctuations, inability to delay pleasure, excessively talking, bursts of rage, and interrupting others were perceived as personality characteristics by these patients and their relatives. Researches examining the experiences of adults who do not receive a diagnosis of ADHD until adulthood suggest that these individuals' chronic inattention and hyperactivity problems may have been interpreted by others as expressions of stupidity, laziness, and rebelliousness. As a result of hearing these over years, they attributed the problem to themselves and internalize the situation [26]. Some other probably ADHD diagnosed cases rejected applying to a hospital for a clinical interview after informed on that pharmacotherapy could be a part of their treatment; also, some cases accepted but never come to the hospital for a clinical assessment. Young et al. [26] described a six-stage process of emotional adjustment to come to terms with the ADHD diagnosis characterized by the following stages of psychological acceptance of their diagnosis of ADHD: (a) relief and elation, (b) confusion and emotional turmoil, (c) anger, (d) sadness and grief, (e) anxiety, and (f) accommodation and acceptance. When we consider that sociodemographic characteristics and total scores of scales were similar between clinically assessed and non-assessed positively

screened cases of PPC, we can say that prevalence of adult ADHD in PPC population would be higher if we were able to assess all of the cases clinically.

Adult ADHD is associated with a high percentage of comorbid psychiatric disorders. In adulthood, between 65% and 89% of all patients with ADHD suffer from one or more additional psychiatric disorders [7,21,27–29]. Most common psychiatric comorbidities are mood, anxiety, and substance use disorders [14,21,30]. Results of our study were comparable with literature, 80.0% of adult ADHD diagnosed participants of OC and 84.6% of PPC had one or more additional psychiatric disorder. 46.7% of adult ADHD diagnosed participants of OC and 30.8% of PPC had more than one comorbid psychiatric disorder. Our results also agree well with Deberdt et al. [21] study which also used DIVA (based on DSM-5 criteria) as a diagnostic tool and 88.5% of adult ADHD diagnosed patients found having at least one comorbid psychiatric disorder. In our study, ADHD diagnosed patients of OC had higher scores in ADHD scales than ADHD diagnosed patients of PPC which showed us that ADHD was more severe in OC population. Even though it did not reach statistical significance ($\chi^2 = 0.942$; $p = 0.526$), this may help us to understand the higher rate (46.7% vs 30.8%) of having more than one comorbid psychiatric disorder in ADHD diagnosed patients of OC population compared to PPC.

The most common type of comorbid psychiatric disorder among ADHD diagnosed patients of OC and PPC population was depressive disorder with a similar prevalence (40.0% vs 46.1%). Our results agree well with Deberdt et al. [21] study which reported a prevalence of 43% but prevalence results of our study were lower than Rao and Place [24] and Almeida Montes et al. [22] studies in which the reported comorbid depressive disorder prevalence was 52% and 73%, respectively. We can say that comorbid depressive disorder prevalence among ADHD diagnosed adult patients of psychiatry clinics is much more higher than lifetime depressive disorder prevalence of 16.2% which is reported for the general adult population [31] so clinicians should always keep in mind depressive disorders among this population. In the case of a patient presenting with ADHD and clinically meaningful depressive symptoms, the first priority in treatment should address the affective disorder [27].

Comorbidity of bipolar disorder among ADHD diagnosed patients of OC and PPC population was found to be 10.0% and 7.7%, respectively. This result was also comparable with Deberdt et al. [21] study in which reported comorbid bipolar disorder prevalence was 8.3% among adult ADHD patients. Bipolar disorder prevalence had been reported as 0.5–1.5% in general population but in recently published studies bipolar-I and bipolar-II cases were involved and reported a prevalence reach up to 5% [32]. Results of our study showed a higher bipolar disorder prevalence than the defined prevalence in community-based studies of recent years. In another study, comorbidity of ADHD among bipolar disorder diagnosed patients was found to be 16.3% and it is stated that bipolar disorder began earlier and progressed more severe in additionally ADHD diagnosed cases so screening of ADHD is advised in early-onset bipolar disorders as a conclusion [33].

Comorbidity of anxiety disorders among ADHD diagnosed patients of OC and PPC population was found to be 40.0% and 15.4%, respectively. Based on DSM-5, obsessive-compulsive disorder and post-traumatic stress disorder were not evaluated as an anxiety disorder in our study. According to Deberdt et al. [21] study, in which diagnostic criteria were also based on DSM-5, comorbidity of anxiety disorders was found to be 36.4%. It can be said that prevalence results of our study agree well in OC population but do not agree in PPC population compared to this study.

The comorbidity of ADHD and alcohol-substance use disorders has been consistently observed by various researches [27]. In our study, comorbidity of alcohol-substance use disorders among ADHD diagnosed patients of OC and PPC population was found to be 36.6% and 30.7%, respectively. This result was also comparable with the study of Deberdt et al. [21], which reported a prevalence of 29.5%. In a meta-analysis examining the prevalence of ADHD among alcohol-substance use disorder patients have found the prevalence of 23.1% which is higher than the ADHD prevalence of general population [34]. Patients in withdrawal of alcohol or substance who were not able to adapt a diagnostic interview of ADHD were excluded in our study and also there is a directly applied alcohol-substance use disorder OC in our hospital. These two situations may have decreased the calculated prevalence in our study. In light of these data, we can say that all the ADHD diagnosed adult patients should systematically be screened in terms of alcohol-substance use disorders. Evidence should take in consideration that treatment of ADHD dramatically decreases the risk of alcohol-substance use disorder [35].

The presence of comorbid disorders in adults with ADHD gives rise to additive clinical effects, leading to a more global impairment and greater resistance to treatment [27,36]. Adult ADHD cases mostly applied to psychiatry clinics because of concomitant psychiatric disorders. The high prevalence of comorbid disorders poses a barrier to proper recognition as many core ADHD symptoms can be nonspecific symptoms of other psychological disorders [15,37] and this may cause the missing of adult ADHD diagnosis in psychiatry clinics. In our study, only 30.0% of ADHD diagnosed patients of OC were applied suspecting they had an ADHD. Faraone et al. [12] have found that

only 25% of the adults with ADHD had been first diagnosed as having the disorder in childhood or adolescence. When we look at the ADHD diagnosed patients in our study we have seen that 16.7% of OC and 30.8% of PPC population had a prior childhood ADHD diagnosis. Childhood-onset ADHD symptoms are frequently seen as personality characteristics by both patients and their relatives and are not considered as a disorder and cause a delay in psychiatric contact of these cases. Because of a high rate of psychiatric comorbidities in adult individuals with ADHD, it is expected that many individuals with ADHD would already have had contact with psychiatry services [21]. In our study, 60.0% of ADHD diagnosed patients of OC and 61.5% of PPC population had a previous contact with psychiatry clinics. Having a high rate of previous psychiatry service contact and having a relatively low rate of ADHD diagnosis show us that ADHD diagnosis is frequently missed by clinicians. In light of these data, we can say that underlying potential ADHD symptoms should necessarily be evaluated in patients applied for another psychiatric condition.

In this study, we have found that there was no statistically significant difference between ADHD diagnosed and non-diagnosed individuals of OC population in terms of causes of application whereas ADHD diagnosed individuals of PPC reported more marriage/relationship problems, personal problems, and educational problems than patients without ADHD, also reported more occupational problems which did not reach statistical significance. On the other hand, only 15.4% of ADHD diagnosed patients of PPC were applied suspecting they had an ADHD. Based on these data, we can say that adult ADHD individuals of PPCs are applying to these centres frequently with their marital, personal, educational, and occupational problems when adult ADHD individuals of OCs are applying for comorbid psychiatric disorders. As a conclusion, due to the high prevalence of adult ADHD in PPC population, mental health worker's knowledge on core symptoms of adult ADHD and their reasons of application is very important in referral of possibly ADHD diagnosed individuals to psychiatry clinics for a further treatment.

Limitations

The study sample is consisted of applicants of a tertiary healthcare service provider (university hospital) and a psychotherapy centre which is private where individuals apply with their own means. This sample may not represent the general population in terms of sociodemographic and clinical characteristics. It is known that a selected population, for instance having relatively high expectations or being in a much more complicated clinical situation, applies to a university hospital compared to a state hospital or a community health centre. On the other hand, applicants of a PPC may differ in Izmir compared to other cities; Izmir is a western metropolis in which threshold of going to a therapist may be lower. However, the high exclusion rates in both centres and having a high rate of clinically non-assessed positively screened cases in psychotherapy centre bring into question the generalizability of our results and also the absence of a healthy control group is an important limitation.

Even though the diagnostic validity of ADHD in adult population have been shown before, suitability of the used diagnostic criteria for adult population is still controversial but there have been some recent changes in DSM-5 increasing the validity of the diagnostic criteria in this population. Our study based on DSM-5 criteria and we used multiple screening scales such as ASRS and Turgay's Adult ADD/ADHD DSM-IV Based Diagnostic Screening and Rating Scale in order to overcome these restrictions. In addition to these, a thorough diagnostic assessment is done by using DIVA instrument which is a semi-structured diagnostic interview for adults questioning childhood and adulthood symptoms in detail. DIVA is completed with a first-degree relative of the individual (face to face or via telephone) to enable retrospective and collateral information but this was not possible for all cases.

Individuals who screened negative were not clinically evaluated and tested using DIVA so we do not have an estimate of false negatives but we used highly sensitive two screening scales which makes false negatives minimal. Negatively screened cases and positively screened but not having diagnosed with ADHD were not evaluated using SCID-I so this is an important limitation. In this study, comorbid axis-II disorders in ADHD diagnosed patients were not investigated which is another limitation.

ADHD cases may tend to fulfil the scales incompletely and inconsistently, exclusion of these cases from the study is a limitation in terms of false negatives. Also, exclusion of individuals who were in withdrawal of alcohol or substance and were not able to adapt to clinical interview may have increased the false negatives.

Conclusion

Our study indicated a high prevalence of ADHD and comorbid psychiatric disorders in adults among first time applied consecutive cases of a university hospital general psychiatry OC and a PPC. This population applies to these centres with some other reasons like comorbid disorders, marriage/relationship, personal, educational, and occupational problems. It seems that ADHD individuals of adult population facing marriage/relationship, personal, and educational problems

prefer applying to a psychotherapy centre expecting a treatment other than a pharmacotherapy. A very low rate of ADHD individuals is applying to PPC or OC with suspect of having an ADHD and a very low rate of them are previously diagnosed with ADHD even though having a high rate of prior psychiatry service contact. ADHD diagnosis is probably missed by clinicians because of a high prevalence of comorbid psychiatric disorders. It is hoped that data from this study contribute to a better understanding of the prevalence of ADHD in adults, comorbid disorders, their clinical presentation, and their causes of application to psychiatry clinics and psychotherapy centres. To our knowledge, this is the first study to evaluate the prevalence of adult ADHD, comorbid disorders, their clinical presentation, and causes of applications in a group (PPC) expecting treatment method other than pharmacotherapy. However, further studies in other mental health centres with larger sample sizes are needed to improve the knowledge and experience in this field.

Disclosure statement

No potential conflict of interest was reported by the authors.

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