Eastern Journal of Medicine 17 (2012) 1-10

Original Article

Characteristics of patients with ADHD in psychiatric and pediatric ADHD clinics

Dusan Kolar[a,*], Lily Hechtman[b], Emmett Francoeur[c], Jodi Paterson[d]

[a]*Department of Psychiatry, Queen's University, Kingston, Canada*
[b]*Department of Psychiatry, Montreal Children's Hospital, McGill University, Montreal, Canada*
[c]*Department of Pediatrics, Montreal Children's Hospital, McGill University, Montreal, Canada*
[d]*Department of Pediatrics, ADHD Clinic, Montreal Children's Hospital, Montreal, Canada*

Abstract. This study explores whether the child psychiatry ADHD clinic and the pediatric ADHD clinic serve different population of patients regarding the patient characteristics, severity of ADHD symptoms and comorbid disorders, thereby testing the efficacy of a triage system set up to direct patients referred for Attention Deficit Disorder symptoms to the appropriate clinics. Charts of 163 children and adolescents treated in two clinical settings were analyzed with regard to demographic characteristics, family structure, DSM-IV diagnosis of ADHD, and a variety of comorbid characteristics assessed through the Child Symptom Inventory-4 or Adolescent Symptom Inventory-4. Patients in the child psychiatry ADHD clinic were older and consequently have more years of schooling. Child psychiatry ADHD clinic had a greater number of patients with combined subtype of ADHD than the pediatric ADHD clinic. Likewise, the child psychiatry clinic had a higher number of patients with comorbid disorders. The child psychiatry ADHD clinic received patients who were older and had more comorbid psychiatric disorders. The study suggests that there exists an appropriate division of labour in that a third line specialty psychiatry clinic receives the more difficult complex cases.

Key words: ADHD, comorbidity, psychiatry, pediatrics, outpatient clinics

1. Introduction

Attention deficit/hyperactivity disorder (ADHD) is a neurobiological disorder, which affects 5-10% of school-aged children is (1) and is associated with significant impairments in academic, social, and emotional functioning.

ADHD is a highly comorbid disorder. Psychiatric disorders comorbid with ADHD include externalizing disorders, such as oppositional defiant disorder (ODD) and conduct disorder (CD) as well as internalizing disorders such as mood disorders and anxiety disorders (2). Severity of ADHD is closely related with comorbidity.

*Correspondence: Dr. Dusan Kolar
Department of Psychiatry, Queen's University, Kingston, Ontario, Canada.
E-mail: dkolar22@yahoo.com
Received: 08.06.2011
Accepted: 03.10.2011

Increased level of comorbid internalizing and externalizing symptoms positively correlates with severity of ADHD symptoms. Patients with ADHD and comorbid disorders have more ADHD symptoms and more severe ADHD symptoms than those with ADHD alone. Comorbidity with externalizing disorders has special importance. The highest comorbidity rates are for ODD/CD and these disorders co-occur in 30% to 50% of cases of ADHD in both epidemiologic and clinical samples (3). There appears to be no difference in the severity of ADHD if patients with ADHD have only comorbid ODD or both ODD and CD (4). Children with ADHD and ODD/CD comorbidity have more serious adjustment difficulties and social dysfunction than children with only ADHD. Conduct problems in children with ADHD have a considerable effect on their ability to interact appropriately with others (5).

Patients with comorbid ADHD and conduct disorder have a distinctive clinical picture characterized by earlier age of onset and higher male-female sex ratio in comparison with those

with only ADHD (1). Poor school performance and antisocial behavior in these patients are a result of comorbidity between ADHD and ODD/CD (6). Patients with ADHD and externalizing disorders are at greater risk for the future development of internalizing disorders, including depression and anxiety disorders (3,4).

Optimally, children who are treated in primary care settings are less comorbid because many of the severe ADHD and comorbid cases are referred to secondary or tertiary mental health care facilities.

There are no precise data on how many children and adolescents with ADHD are treated in non-psychiatric settings, but it could be a considerable number. Literature about this topic is very sparse. Rushton and colleagues suggested that most psychosocial problems are initially treated in primary care without referral to mental health services (7). This situation may be problematic for patients with ADHD if ADHD symptomatology is severe and if patients are comorbid.

Some pediatricians believe that children who are managed in primary care setting are less likely comorbid and have less severe ADHD symptoms (8). However, a study conducted by Busch and colleagues showed that children with ADHD treated in psychiatric and pediatric services had similar levels of ADHD symptoms, comorbidity with depressive, anxiety and disruptive disorders, and similar level of impairment (8). These authors concluded that there is a possibility that a certain number of children with comorbid psychiatric disorders are undiagnosed and untreated in the primary care setting.

Undiagnosed psychiatric disorders could place children with ADHD at high risk for negative outcome, because untreated psychiatric disorders compromise school achievement and overall psychosocial functioning. Treatment of comorbid psychiatric disorders is very important for the positive outcome of ADHD. Since this treatment does not include only medication, primary care physicians could be faced with limited sources for the treatment of complicated cases of ADHD. The most cost-effective treatment for comorbid disorders usually involves behavior therapy, with or without medication (9). The most effective treatment for many ADHD patients with various comorbidities may need to be multimodal and patients may benefit most from treatment by professionals with special expertise in the area of ADHD (10).

Various types of clinicians treat children with ADHD. These include child psychiatrists, psychologists, pediatricians, and neurologists. Ideally, patients with ADHD and psychiatric comorbidity should be directed to the psychiatric

ADHD clinic. Patients with ADHD and neurological problems, e.g. severe tics, Tourette syndrome, and epilepsy should be directed to neurology clinic, and finally patients with possible learning disabilities and ADHD symptoms should be directed to a learning clinic. Even though there are no precise data on how many children and adolescents are treated in the various settings, clinical experience suggests that the majority of patients are usually seen in the pediatric and child psychiatry ADHD settings.

In our research we wanted to explore if in fact there were significant differences in patient characteristics, e.g. age, sex, severity of ADHD symptoms and comorbidity in patients referred to a pediatric vs. a child psychiatry clinic.

We performed a comparison of characteristics (demographic, diagnostic and clinical severity) in order to determine if these clinics serve different populations.

We hypothesize that children seen in the psychiatry clinic will be older, more comorbid and have more severe symptomatology.

2. Materials and method

2.1. Subjects

Subjects consisted of 163 children and adolescents (male= 120, female= 41, mean age=10.33) with ADHD who have been assessed and treated in two clinical settings at the Montreal Children's Hospital - the child psychiatry ADHD clinic and the pediatric ADHD clinic in an 18 month period. Generally patients with less complicated clinical situations went to the pediatric ADHD clinic while the more complex cases went to the psychiatric ADHD clinic.

2.2. Procedures and instruments

Research data were collected by chart review of all patients who were assessed and treated in the child psychiatry ADHD clinic and in the pediatric ADHD clinic in a designated period of time. Retrospective chart review included the demographic data, psychiatric/pediatric team assessment data, as well as the data from Child/Adolescent Symptom Checklist (11). We analyzed the following characteristics of patients: age, sex, grade in the school, family structures, siblings, ADHD diagnosis according to the DSM-IV (Diagnostic and Statistical Manual for Mental Disorders, fourth revision) diagnostic criteria (12), and a variety of comorbid characteristics via the Child Symptom Inventory- 4 (ages 5 to 12

years) and Adolescent Symptom Inventory-4 (ages 12 to 18 years). The Symptom Inventories are screening instruments for the behavioral, affective, and cognitive symptoms of over a dozen DSM- IV childhood disorders. There are separate symptoms checklists for patient, parents and teacher. Analyzing the data from this instrument would provide a view of ADHD symptoms and their severity as well as the presence and severity of symptoms of comorbid conditions of patients in both clinics.

2.3. Statistical analysis

Analysis of the data were performed using SPSS software. For continuous variables, such as age, grade in school, and other descriptors statistics were calculated and reported as a mean and standard deviation. The analysis of variance was used for evaluating the difference in means between the two groups.

Categorical variables, such as sex and comorbid diagnoses, were described using frequency distributions. Chi-square test was used to detect differences in categorical variables. Fisher's exact test was used to compare the rates of comorbidity in pediatric and child psychiatry clinic.

3. Results

The total number of patients (163) who were seen in both clinics in an 18 month period was reduced due to incompleteness of the Child/Adolescent Symptom Checklist for a certain number of patients. Therefore, only the data from charts which contained all needed information were entered into statistical analysis, namely charts of 118 patients.

3.1. Demographic characteristics

Table 1 A and B summarize the demographic characteristics of patients. Patients in the child psychiatry ADHD clinic were older (mean age 12.09) and consequently have more years of schooling than patients in the pediatric ADHD clinic. In both clinics there were more males than females (71.4%:28,6% in child psychiatry ADHD clinic and 78.2%:21.8% in pediatric ADHD clinic). Most patients in both clinics were White.

With regard to family structure most parents of our participants were married or living together. There were no statistical differences between groups regarding gender, ethnicity and family intactness (table 1A, table 1B).

3.2. Comorbidity profile

We compared comorbid diagnoses in the two groups based on results of the Symptom Inventory. Table 2 presents these comorbid symptom groupings of participants in the child psychiatry ADHD clinic and the pediatric ADHD clinic rated by teachers. According to the teacher rating, the child psychiatry ADHD clinic had a greater number of patients with inattentive (x^2=3.77, p=0.052) and hyperactive/impulsive subtype of ADHD (x^2 =4.63, p=0.037) as well as patients with dysthymia (x^2=5.43, p=0.020) than pediatric ADHD clinic (table 2).

According to parent ratings (table 3) the child psychiatry ADHD clinic had a higher number of patients with inattentive (x^2=5.19, p=0.023) and hyperactive/impulsive type of ADHD (Chi-Square=3.62, p=0.057) as well as higher comorbidity symptom rates than the pediatric ADHD clinic with regard to oppositional defiant disorder (ODD), separation anxiety disorder (SAD), and vocal tics. There was also a trend for the child psychiatry ADHD clinic to have more patients with generalized anxiety disorder (x^2=3.19, p=0.074) than the pediatric ADHD clinic. The pediatric ADHD clinic tended to have more patients with enuresis (table 3).

Comparison of parent and teacher ratings (table 4) shows the high level of rating agreement regarding the diagnoses of inattentive subtype of ADHD (Phi=0.63, p=.000), hyperactive/impulsive subtype of ADHD (Phi=0.45, p=.000), ODD (Phi=0.40, p=.000), social phobia (Phi=0.42, p=.000), and substance use disorders (Phi=-0.54, p=.001).

The child psychiatry ADHD clinic had a greater number of patients with the combined subtype of ADHD than the pediatric ADHD clinic (table 5). In parent ratings (Table 6) 50.0% of child psychiatry patients and 32.7% of pediatric ADHD patients had combined subtype of ADHD. Differences did not quite reach statistical significance (x^2=3.622, p=0.057). Results are similar for teacher ratings with regard to differences between clinics in the combined subtype, although teacher ratings percentages were somewhat lower (35.9% of patients in the child psychiatry ADHD clinic and 20.0% in the pediatric ADHD clinic; $X2$ =3.682, p<.055) (table 5 and table 6).

4. Discussion

Patients in the child psychiatry ADHD clinic were older than those in pediatric ADHD clinic. This result is expected because many children with ADHD have been seen initially in a pediatric setting and some of them have subsequently been referred to the psychiatric ADHD clinic due to psychiatric comorbidity or more complicated presentation of ADHD. Patients with comorbidity are usually older than those without comorbidity.

Table 1A. Demographic Characteristics

	Group	N	Mean	Std. Deviation	Std. Error Mean	F	df	P
AGE	Child psych	63	12.0952	3.7790	.4761	11.123	116	0.001*
	Ped. ADHD	55	10.0182	2.4981	.3368			
Number of Siblings	Child psych	63	1.4286	2.0377	.2567	6.021	109	0.097
	Ped. ADHD	48	.9167	.6469	9.337E-02			
Years of Schooling	Child psych	62	5.6129	3.3699	.4280	8.830	115	0.035**
	Ped. ADHD	55	3.4364	2.4477	.3300			
Family Size	Child psych	58	3.9310	1.6207	.2128	0.265	103	0.292
	Ped. ADHD	47	3.6383	1.1117	.1622			

* Child psychiatry ADHD clinic patients were older than patients in pediatric ADHD clinic
** Child psychiatry clinic patients had more years of schooling than pediatric ADHD clinic patients

Table 1B. Demographic Characteristics

	Child Psych. ADHD		Pediatric ADHD		Pearson Chi-Square	df	P
	N	%	N	%			
Gender							
male	45	71.4	43	78.2			
female	18	28.6	12	21.8	0.706	1	0.401
Ethnic							
White	59	93.7	46	88.5			
Black	2	3.2			4.599	2	0.100
Asian	2	3.2	6	11.5			
Family Int							
married or living together	37	67.3	32	64.0		3	0.681
separated	4	7.3	7	14.0			
divorced	9	16.4	8	16.0	1.505		
never married	5	9.1	3	6.0			

Most parents of our participants were married or lived together. That is a very important issue because living in a non-intact family can contribute to the risk for comorbidity of ADHD with externalizing disorders (4). Vulnerability for the multiple comorbid disorders is increased in the presence of parent-child conflict. Such conflict may influence both ADHD and comorbid externalizing disorders, such as oppositional defiant disorder and conduct disorder (13).

According to DSM-IV criteria ADHD symptoms are required to be present in multiple settings. Therefore we took into account both parent and teacher ratings in Symptom Inventory and analyzed both of them in order to establish comorbid symptom groupings for our participants. It is apparent that the diagnosis of ADHD and the level of psychiatric comorbidity are higher in the child psychiatry ADHD clinic than those in the pediatric ADHD clinic.

Table 2. Comorbidity Profile – Teacher Ratings

Disorder	Child Psych. ADHD			Pediatric ADHD			Pearson	df	p
	N	%	Tot. N	N	%	Tot. N	Chi-Square		
ADHD-IN	31	48.4	64	17	30.9	55	3.776	1	0,052 *
ADHD-HYP	24	37.5	64	11	20.0	55	4,363	1	0.037**
ODD	24	37.5	64	12	21.8	55	3.447	1	0.063
CD	2	3.1	64	3	5.5	55	0.399	1	0.528
GAD	2	6.9	29				0.655	1	0.418
SOC. PHOB	11	17.2	64	7	12.7	55	0.458	1	0.498
DYSTHYMIA	6	9.4	64				5.430	1	0.020***
SOMATIZ	2	6.9	29				0.655	1	0.418
OCD	4	6.3	64				3.557	1	0.059
SCHIZ	6	9.4	64	2	3.6	55	1.553	1	0.213
MAJDEP	2	3.1	64				1.748	1	0.186
SPEC.PHOB	3	4.7	64				2.645	1	0.104
ENURESIS									
MOT.TICS	11	17.2	64	8	14.5	55	0.154	1	0.695
VOC.TICS	14	21.9	64	6	10.9	55	2.544	1	0.111
DRUG	2	6.9	29				0.655	1	0,418
PANIC	1	3.4	29				0.319	1	0.572
BIPOLAR	2	6.9	29				0.655	1	0.418
BULIMIA	1	3.4	29				0.319	1	0.572
ANOREXIA	2	6.9	29				0.655	1	0.418
APD									
SPD	4	13.8	29	2	22.2	9	0.367	1	0.545
PTSD	4	6.3	64	1	1.8	55	1.443	1	0.230
PDD	4	11.4	35	1	2.2	46	2.939	1	0.086

ADHD-IN = ADHD- Inattentive type, ADHD-HYP = ADHD-Hyperactive-impulsive type, ODD = Oppositional Defiant Disorder, CD= Conduct Disorder, GAD= Generalized Anxiety Disorder, SOC. PHOB = Social Phobia, DYSTHYMIA= Dysthymic Disorder, SOMATIZ = Somatization Disorder, OCD = Obsessive-Compulsive Disorder, SCHIZ = Schizophrenia, MAJDEP = Major Depressive Disorder, SPEC.PHOB = Specific Phobia, ENURESIS = Enuresis or encopresis, MOT.TICS = Motor Tics, VOC.TICS = Vocal Tics, DRUG = Drug Use, PANIC = Panic Attack, BIPOLAR = Bipolar Disorder, BULIMIA = Bulimia, ANOREXIA = Anorexia Nervosa, APD = Antisocial Personality Disorder, SPD = Shizoid Personality Disorder, PTSD = Posttraumatic Stress Disorder, PDD= Pervasive Developmental Disorder.

* Child psychiatry ADHD clinic had a greater number of patients with inattentive subtype of ADHD than pediatric ADHD clinic

** Child psychiatry ADHD clinic had a greater number of patients with hyperactive/impulsive subtype of ADHD than pediatric ADHD clinic

*** Child psychiatry ADHD clinic had a higher proportion of patients with dysthymia than pediatric ADHD clinic

Research results support our hypotheses with patients with regard to comorbid disorders and severity of ADHD. The child psychiatry clinic had more patients with oppositional defiant disorder, separation anxiety disorder, vocal tic, dysthymia, and generalized anxiety disorder than the pediatric ADHD clinic. The child psychiatry ADHD clinic also had the greater number of patients with both inattentive and hyperactive/impulsive and both inattentive and hyperactive/impulsive combined subtype of ADHD.

With regard to the high rates of ADHD and ODD our findings are comparable to the study conducted by Gadow and colleagues that explored the prevalence of psychiatric disorders

Table 3. Comorbidity Profile – Parent Ratings

Disorder	Child Psych. ADHD			Pediatric ADHD			Pearson	df	P
	N	%	Tot. N	N	%	Tot. N	Chi-Square		
ADHD-IN	39	60.9	64	22	40.0	55	5.190	1	0.023 *
ADHD-HYP	32	50.0	64	18	32.7	55	3.622	1	0.057 **
ODD	35	54.7	64	19	34.5	55	4.842	1	0.028 ***
CD	4	6.3	64	1	1.8	55	1.443	1	0.230
GAD	15	23.4	64	6	10.9	55	3.195	1	0.074 ●
SOC. PHOB	20	31.3	64	18	32.7	55	0.030	1	0.863
SAD	5	7.8	64				4.485	1	0.034****
DYSTHYMIA	7	10.9	64	8	14.5	55	0.350	1	0.554
SOMATIZ	3	10.3	29				1.011	1	0.315
OCD	9	14.1	64	6	10.9	55	0.267	1	0.605
SCHIZ	4	6.3	64	2	3.6	55	0.422	1	0.516
MAJDEP	1	1.6	64				0.867	1	0.352
SPEC.PHOB	8	12.5	64	5	9.1	55	0.353	1	0.552
ENURESIS	1	3.4	29	2	22.2	9	3.329	1	0.068 ●
MOT.TICS	11	17.2	64	7	12.7	55	0.458	1	0.498
VOC.TICS	19	29.7	64	8	14.5	55	3.866	1	0.049*****
DRUG	5	17.2	29	1	11.1	9	0.194	1	0.660
PANIC	4	13.8	29	1	11.1	9	0.043	1	0.835
BIPOLAR	3	10.3	29	1	11.1	9	0.004	1	0.948
BULIMIA	5	17.2	29	2	22.2	9	0.113	1	0.736
ANOREXIA	4	13.8	29				1.387	1	0.239
APD	1	3.4	29				0.319	1	0.572
SPD	5	17.2	29	1	11.1	9	0.194	1	0.660
PTSD	6	9.4	64	3	5.5	55	0.650	1	0.420
PDD	2	4.1	49	2	4.3	47	0.002	1	0.966

ADHD-IN = ADHD- Inattentive type, ADHD-HYP = ADHD-Hyperactive-impulsive type, ODD = Oppositional Defiant Disorder, CD= Conduct Disorder, GAD= Generalized Anxiety Disorder, SOC. PHOB = Social Phobia, DYSTHYMIA= Dysthymic Disorder, SOMATIZ = Somatization Disorder, OCD = Obsessive-Compulsive Disorder, SCHIZ = Schizophrenia, MAJDEP = Major Depressive Disorder, SPEC.PHOB = Specific Phobia, ENURESIS = Enuresis or encopresis, MOT.TICS = Motor Tics, VOC.TICS = Vocal Tics, DRUG = Drug Use, PANIC = Panic Attack, BIPOLAR = Bipolar Disorder, BULIMIA = Bulimia, ANOREXIA = Anorexia Nervosa, APD = Antisocial Personality Disorder, SPD = Shizoid Personality Disorder, PTSD = Posttraumatic Stress Disorder, PDD= Pervasive Developmental Disorder.

* Child psychiatry ADHD clinic had a greater proportion of patients with inattentive subtype of ADHD than pediatric ADHD clinic

** Child psychiatry ADHD clinic had a greater proportion of patients with hyperactive/impulsive subtype of ADHD than pediatric ADHD clinic

*** Child psychiatry ADHD clinic had greater ODD comorbidity than pediatric ADHD clinic

**** Child psychiatry ADHD clinic had a greater number of patients with separation anxiety disorder than pediatric ADHD clinic

***** Child psychiatry ADHD clinic had a higher proportion of patients with vocal tics than pediatric ADHD clinic

● Child psychiatry ADHD clinic had a greater number of patients with GAD comorbidity – there is a trend to be significantly different

●● Pediatric ADHD clinic had a greater proportion of patients with enuresis than child psychiatry ADHD clinic – trend to be significantly different

in clinical and community samples of preschool children. However, they found that the relative distribution of ADHD symptoms and comorbid disorder symptoms within both groups was similar. In both clinical and community samples most common disorders were ADHD and ODD, rates of CD and GAD were intermediate, while the other anxiety disorder symptoms were common (14). Since comorbidity contributes to the severity of ADHD (3), then we may conclude that patients in the child psychiatry ADHD clinic had more severe ADHD symptoms than those in the pediatric ADHD clinic. Many of them were diagnosed with some comorbid psychiatric disorders in the child psychiatry ADHD clinic.

Table 4. Comparisons Teacher v.s Parent Ratings

Disorder	Parent/Teacher Yes		Parent/Teacher No		Phi	P
	N	%	N	%		
ADHD-IN	63	38.9	67	41.4	0.630	0.000*
ADHD-HYP	41	25.3	76	46.9	0.455	0.000 *
ODD	39	24.1	73	45.1	0.406	0.000 *
CD	1	0.6	151	93.2	0.138	0.080
GAD	1	2.4	32	78.0	0.174	0.265
SOC. PHOB	26	16.0	93	57.4	0.422	0.000*
DYSTHYMIA	2	1.2	134	82.7	0.088	0.265
SOMATIZ			35	85.4	-0.074	0.634
OCD	1	0.6	134	83.2	0.029	0.711
SCHIZ			142	88.2	-0.062	0.432
MAJDEP			157	97.5	-0.013	0.873
SPEC.PHOB	2	1.2	137	85.1	0.143	0.069
ENURESIS						[1]
MOT.TICS	3	1.9	113	70.2	-0.045	0.565
VOC.TICS	5	3.1	105	62.5	-0.024	0.758
DRUG	2	5.0	34	85.0	-0.546	0.001*
PANIC			33	82.5	-0.067	0.671
BIPOLAR	1	2.5	34	85.0	0.260	0.100
BULIMIA			31	77.5	-0.080	0.613
ANOREXIA	1	2.5	34	85.0	0.260	0.100
APD						[2]
SPD	1	2.5	28	70.0	-0.009	0.954
PTSD			144	89.4	-0.051	0.519
PDD			106	88.3	-0.056	0.540

ADHD-IN = ADHD- Inattentive type, ADHD-HYP = ADHD-Hyperactive-impulsive type, ODD = Oppositional Defiant Disorder, CD= Conduct Disorder, GAD= Generalized Anxiety Disorder, SOC. PHOB = Social Phobia, DYSTHYMIA= Dysthymic Disorder, SOMATIZ = Somatization Disorder, OCD = Obsessive-Compulsive Disorder, SCHIZ = Schizophrenia, MAJDEP = Major Depressive Disorder, SPEC.PHOB = Specific Phobia, ENURESIS = Enuresis or encopresis, MOT.TICS = Motor Tics, VOC.TICS = Vocal Tics, DRUG = Drug Use, PANIC = Panic Attack, BIPOLAR = Bipolar Disorder, BULIMIA = Bulimia, ANOREXIA = Anorexia Nervosa, APD = Antisocial Personality Disorder, SPD = Shizoid Personality Disorder, PTSD = Posttraumatic Stress Disorder, PDD= Pervasive Developmental Disorder.

[1] No statistics are computed because ENURESIS. T is a constant (there is no teacher rating for this disorder)
[2] No statistics are computed because APD.T is a constant (there is no teacher rating for this disorder)
* There are agreement between parent and teacher ratings in terms of diagnoses of ADHD both subtypes, ODD, CD, social phobia, and substance use disorders

Table 5. Combined subtype of ADHD – Teacher Rating

Group	Combined Type Yes		Combined Type No		Tot. N	Pearson Chi-Square	df	P
	N	%	N	%				
Child Psychiatry	23	35.9	41	64.1	64	3.682	1	0.055
Pediatric ADHD	11	20.0	44	80.0	55			

Table 6. Combined subtype of ADHD – Parent Ratings

Group	Combined Type Yes		Combined Type No		Tot. N	Pearson Chi-Square	df	P
	N	%	N	%				
Child Psychiatry	32	50.0	32	50.0	64	3.622	1	0.057
Pediatric ADHD	18	32.7	37	67.3	55			

The study conducted by Busch and colleagues (8) demonstrated different findings. Patients with ADHD from psychiatric and pediatric settings in this study show similar levels of ADHD symptoms and comorbidity with mood, anxiety and disruptive behavior disorders as well as impairments in cognitive, interpersonal, and academic functioning. However, it is unclear if these clinics had a triage system or if patients just randomly went to one or the other clinic. Thus, both clinics served similar populations.

The criteria for ADHD require the presence of symptoms in two or more settings. Since clinicians need to obtain the symptom ratings from home and school settings, the level of agreement between parent and teacher ratings could be an important issue. Our research demonstrates the high levels of agreement between parent and teacher ratings for inattentive and hyperactive/impulsive type of ADHD. De Nijs et colleagues found slight to moderate levels of agreement between parents' scores about ADHD symptoms at home and teachers' scores about ADHD symptoms at school (15).

Different from our findings, Mitsis and colleagues demonstrated that agreement between parents and teachers on structured diagnostic interview in terms of diagnosis of ADHD and its subtypes was relatively poor (16). Overall parent-teacher agreement for both inattentive and hyperactive/impulsive symptoms was low in a study which included preschoolers with ADHD (17). The young age of the children may contribute to this lack of agreement.

Australian research about parent and teacher ratings of ADHD symptoms presented in the Disruptive Behavior Rating Scale showed significant differences on both inattentive and hyperactive scale scores. Parent ratings were higher for all ADHD symptoms (18).

We also found a high level of parent-teacher agreements on oppositional defiant disorder, social phobia, and substance use disorders. There was a trend of agreement in the diagnoses of generalized anxiety disorder and specific phobia. There were no agreements between parent and teacher ratings for other comorbid disorders, e.g. conduct disorders, dysthymia, motor and vocal tics, and bipolar disorder. Verhulst and Akkerhuis (19) demonstrated in their study on parents' and teachers' ratings of behavioral and emotional problems of children aged 4-12 that agreement was higher for externalizing problems than for internalizing problems. The level of agreement in our study was high for externalizing disorders (ADHD, ODD), for substance abuse, and for some internalizing disorders, such as social phobia, whose symptoms may be apparent and recognizable in a social environment. It is reasonable that teachers do not have an opportunity to notice or recognize some comorbid disorders which mainly present in a home environment. Also, there are many differences in the settings in which parents and teachers observe children (17).

The child psychiatry ADHD clinic had more patients with combined subtype of ADHD than the pediatric ADHD clinic. This finding is not

surprising because patients in pediatric ADHD group were younger. Young children who meet criteria for the hyperactive-impulsive subtype of ADHD are more likely to shift to a different subtype over time, most likely to combined subtype (20). inattentive subtype is pretty unstable in young children, whereas in the older children and adolescents inattentive subtype of ADHD is the most common subtype of ADHD (21).

Crystal and colleagues (22) demonstrated that parents perceived combined subtype as having more behavioral problems and hyperactivity. Both parents and teachers perceived that the dimension of aggression is more characteristic of the combined subtype than of the inattentive subtype of ADHD. Children with the combined subtype of ADHD also exhibit more internalizing behavior, such as anxiety and depression, than do children in other subtypes. Thus we can presume that having more patients with combined subtype in the child psychiatry ADHD clinic may be connected with a more severe clinical presentation.

4.1. Limitations of the study

There are two main limitations in our study. First, chart reviews are not always the best source of data. Information about the quality of data is usually lacking. Fortunately, the amount of missing data in our research was low. Second,

Child/Adolescent Symptom Checklist does not give the full DSM-IV diagnosis, just the symptom groupings for the various conditions. Since our findings pertain to the symptoms of psychiatric disorders, symptom prevalence rates may be an overestimation of the frequency of disorders because they are not based on the full set of the DSM-IV-TR diagnostic criteria.

However, the Symptom Checklist offers a lot of data which may be a good source of information about ADHD symptoms and symptoms of comorbid conditions. Third limitation is the absence of information on family income level since this may be useful in providing a fuller picture of patient characteristics.

4.2. In Summary

This study compared patient populations in a pediatric and psychiatric ADHD clinic. Generally patients in the psychiatric ADHD clinic were older and tended to have combined type of ADHD and more comorbidity.

The study suggests that, first a systematic, careful evaluation of comorbidity in children with ADHD is needed as this is a highly comorbid patient population and the identification and treatment of these comorbid condition is crucial for the positive outcome of the patients. Secondly, having a two-tier system where less complex cases are treated by pediatricians and more complex comorbid cases are treated in child psychiatry seems advisable since child psychiatry clinics generally have more expertise in treating these complex, comorbid patients.

References

1. Scahill L, Schwab-Stone M. Epidemiology of ADHD in school-age children. Child Adolesc Psychiatr Clin N Am 2000; 9: 541-555.
2. Biederman J. Attention-deficit/hyperactivity disorder: A selective overview. Biol Psychiatry 2005; 57: 1215-1220.
3. Spencer TJ, Biederman J, Mick E. Attention-deficit/hyperactivity disorder: diagnosis, lifespan, comorbidities, and neurobiology. Ambul Pediatrics 2007; 7: 73-81.
4. Hurting T, Ebeling H, Taainila A, et al. ADHD and comorbid disorders in relation to family environment and symptom severity. Eur Child Adolesc Psychiatry 2007; 16: 362-369.
5. Kuhne M, Schachar R, Tannock R. Impact of comorbid oppositional or conduct problems on attention-deficit hyperactivity disorder. J Am Acad Child Adolesc Psychiatry 1997; 36: 1715-1725.
6. Jensen PS, Martin D, Cantwell DP. Comorbidity in ADHD. Implications for research, practice, and DSM-IV. J Am Acad Child Adolesc Psychiatry 1997; 36: 1065-1079.
7. Rushton J, Bruckman D, Kelleher K. Primary care referral of children with psychosocial problems. Arch Pediatr Adolesc Med 2002; 156: 592-598.
8. Busch B, Biederman J, Cohen LG, et al. Correlates of ADHD among children in pediatric and psychiatric clinics. Psychiatr Serv 2002; 53: 1103-1111.
9. Foster EM, Jensen PS, Schlander M, et al. Treatment for ADHD: is more complex treatment cost-effective for more complex cases? Health Serv Res 2007; 42: 165-182.
10. Culpepper L. Primary care treatment of attention-deficit/hyperactivity disorder. J Clin Psychiatry 2006; 67: 51-58.
11. Gadow KD, Sprafkin J. Child Symptoms Inventory 4, Screening and Norms Manual. Stony Brook, NY: Checkmate Plus 2002.
12. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed (DSM-IV). Washington, DC: American Psychiatric Press 1994.
13. Burt AS, Krueger RF, McGue M, et al. Parent-child conflict and the comorbidity among childhood externalizing disorders. Arch Gen Psychiatry 2003; 60: 505-513.
14. Gadow KD, Sprafkin J, Nolan EE. DSM-IV symptoms in community and clinic preschool children. J Am Acad Child Adolesc Psychiatry 2001; 40: 1383-1392.
15. De Nijs PF, Ferdinand RF, de Bruin EI, et al. Attention-deficit/hyperactivity disorder (ADHD): Parents' judgment about school, teachers' judgement

about home. Eur Child Adolesc Psychiatry 2004; 13: 315-320.

16. Mitsis EM, McKay KE, Schulz K, Newcorn JH, Halperin JM. Parent-teacher concordance for DSM-IV attention-deficit/hyperactivity disorder in a clinic-referred sample. J Am Acad Child Adolesc Psychiatry 2000; 39: 308-313.
17. Murray DW, Kollins SH, Hardy KK, et al. Parent versus teacher ratings of attention-deficit/hyperactivity disorder symptoms in the preschoolers with attention-deficit/hypractivity disorder treatment study (PATS). J Child Adolesc Psychopharmacol 2007; 17: 605-619.
18. Gomez R. Australian parent and teacher ratings of the DSM-IV ADHD symptoms: differential symptom functioning and parent-teacher agreement and differences. J Atten Disord 2007; 11: 17-27.
19. Verhulst FC, Akkerhuis GW. Agreement between parents' and teachers' ratings of behavioral/emotional problems of children aged 412. J Child Psychol Psychiatry 1989; 30: 123-136.
20. Lahey BB, Pelham WE, Loney J, Lee SS, Willcutt E. Instability of the DSM-IV subtypes of ADHD from preschool through elementary school. Arch Gen Psychiatry 2005; 62: 896-902.
21. Nolan EE, Gadow KD, Sprafkin J. Teacher reports of DSM-IV ADHD, ODD, and CD symptoms in schoolchildren. J Am Acad Child Adolesc Psychiatry 2001; 40: 241-249.
22. Crystal DS, Ostrander R, Chen RS, August GJ. Multimethod assessment of psychopathology among DSM-IV subtypes of children with attention-deficit/hyperactivity disorder: self-, parent, and teacher reports. J Abnorm Child Psychol 2001; 29: 189-205.