Prevalence and Clinical Characteristics of Attention Deficit Hyperactivity Disorder Among Primary School Students in Bangkok

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Abstract

Attention deficit hyperactivity disorder (ADHD) is an important disorder because it is the most prevalent chronic health condition affecting school aged children. Children with ADHD are at risk for academic and behavior problems. There are several studies in many countries worldwide. In Thailand, there have been a few published papers about ADHD. Most of them were studies in a clinically referred population. Four hundred and thirty-three first to sixth grade students from Wat Samiennaree School were included in this study. All children were administered Raven's progressive matrices test for estimation of intellectual functioning and were observed for their behavior in the classrooms by one researcher. Their demographic data was collected by questionnaires. The revised Conners rating scales were scored for each student. Students whose parents did not score the Conners parent rating scale were excluded. The parents of students, whose scores were positive for ADHD, were interviewed according to DSM IV criteria. 353 (81.5%) students from 433 were enrolled in this study. 23 students were diagnosed with ADHD making a prevalence of 6.5 per cent. There were 11 boys and 12 girls. The ratio of male to female was 1:1.09. The ADHD students had lower scores in mathematics than the group without this diagnosis with statistical significance ($p = 0.006$).

Key word : Attention Deficit Hyperactivity Disorder, Primary School Students

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Attention deficit hyperactivity disorder (ADHD) has been described for more than 100 years, although terminology has changed and controversy continues over definition and boundaries[1]. In the 1960s, in DSM II, motoric symptoms were stressed and the disorder was called hyperkinetic reaction of childhood. In 1980, DSM III renamed the disorder as attention deficit disorder and emphasized inattention as its core feature. In 1987 with DSM III-R, the disorder was renamed attention-deficit hyperactivity disorder (ADHD). Both inattention and hyperactivity were emphasized as equally important core features. Although the name ADHD remained the same in DSM IV, depending on what symptoms predominate, DSM IV recognizes three subtypes of ADHD, including a predominantly inattentive subtype, a predominantly hyperactive-impulsive subtype and a combined subtype[2].

ADHD is the most common neurobehavioral disorder of childhood. ADHD is also among the most prevalent chronic health conditions affecting school aged children. It frequently persists and is associated with significant comorbidities and dysfunction in later life. ADHD adolescents and young adults are at risk for school failure, emotional difficulties, poor peer relationships and trouble with the law. In the past it was believed that all children with ADHD outgrew their problem. It is now known from prospective studies that this is not true. On average, about 60 to 80 per cent of children with ADHD continue to manifest the full syndrome well into adolescence[1-6]. Besides the continuation of core ADHD symptoms, early studies found a worse outcome for ADHD adolescents, including high rates of delinquent behavior in 25 per cent to 50 per cent; poorer self esteem, lower academic achievement, new diagnoses of conduct disorder and greater substance abuse. About 11 per cent to 30 per cent of ADHD children are learning disabled in the area of reading, spelling or arithmetic[7,8]. Coexisting mental health disorders substantially increase the cost of treating ADHD[9]. Pediatricians and other primary care clinicians frequently are asked by parents and teachers to evaluate a child for ADHD. Early recognition, assessment and management of this condition can redirect the educational and psychosocial development of most children with ADHD[10].

The prevalence of ADHD in the general population is approximately 3 to 5 per cent of school aged children[3,5,6]. Prevalence rates, however, vary according to the population that are sampled, the diagnostic criteria, and diagnostic instruments that are used as shown in Table 1. A recent review of prevalence rates in school-aged community samples (rather than referred samples) indicated rates varying from 4 per cent to 12 per cent[11]. In the general population, 9.2 per cent (5.8%-13.6%) of males and 2.9 per cent (1.9%-4.5%) of females were found to have behavior consistent with ADHD[10]. With the DSM IV criteria (compared with earlier versions), more females have been diagnosed with the predominantly inattentive subtype[8,10,12]. Prevalence rates also vary significantly depending on whether they reflect school samples 6.9 per cent (5.5%-8.5%) *versus* community samples 10.3 per cent (8.2%-12.7%)[10] (Table 1).

In Thailand, there have been a few studies on ADHD. Suvarnakieh K, et al studied 1,054 primary school students in Bangkok[13]. Prevalence of academic problems and ADHD were found to be 21.76 per cent and 2.37 per cent respectively. Boys showed higher probability of having ADHD than girls. The ratio of male and female was 4:1. Sixty per cent of ADHD students were found to have learning disability. The study of Su-Ampan U, et al in 30 ADHD patients found the ratio of male and female to be 14:1[14]. The Thai version of the Conners' Rating scales studied its sensitivity and specificity, which were 74 per cent and 90 per cent, respectively[15,16].

Because ADHD is an important disorder as described, the authors were interested in studying:

1. Prevalence of ADHD in primary school students.
2. Clinical characteristics of ADHD children.
3. Its comorbid learning disability.

MATERIAL AND METHOD

Studied population

The study was conducted at a primary school in the Bangkok Metropolitan area, Wat Samiennaree School, during the 1999-2000 academic year. Two classrooms in each grade level were randomly selected. The total number of students was 433.

Method

First step

Questionnaires, Conners parent rating scales and Conners teacher rating scales were sent out to parents and teachers. The school records on academic

Table 1. Prevalence survey of ADHD.

	Authors	Number of children	Age	Type of sample	Country	Method	Criteria	Prevalence rate of ADHD	Prevalence of ADHD-I	Prevalence of ADHD-HI	Prevalence of ADHD-C	Male/ female ratio	Socioeconomic effect	Response rate	others
1	Szatmari P, et al (1989)[20]	2,722	Age 4-16 yrs	Community	Ontario, Canada	Questionnaire of parents and teachers, interview mother	DSM III	6.3%, [boy 9.0%, girl 2.3%]	No data	No data	No data	3:01	No data	91%	
2	Suvarnakich K, et al (1999)[13]	1,054	First grade students	School (6 schools)	Bangkok, Thailand	Interview children, some parents, teachers	No data	2.37%, [boy 3.9%, girl 0.9%]*	No data	No data	No data	4:01	No effect on family income, increase if parental educational increase	No data	LD 60%
3	Su-Ampun U (1989)[14]	30	Age 5-11 yrs	Clinical referred	Bangkok, Thailand	Interview	ICD-9	no data	No data	No data	No data	16:01	No data		
4	Wolraich ML, et al (1995)[12]	8,258	Kindergarten to grade 5	School (16 schools)	Middle Tennessee county, USA	Questionnaire of teachers	DSM IV	11.4%, [boy 16.2%, girl 6.1%]*	5.4%, [boy 7.2%, girl 3.5%]	2.4%, [boy 3.8%, girl 0.9%]	3.6%, [boy 5.3%, girl 1.6%]	3:01		All	
5	Baumgaertel A, et al(1995)[18]	1,077	Age 5-12 yrs	School	Regensburg, Germany	Questionnaire of teachers	DSM IV	17.80%	9%	3.90%	4.80%	2-5:1	No data		
6	Wolraich ML, et al (1998)[8]	4,323	Kindergarten to grade 5	School	Tennessee county (10 schools,214 teachers), USA	Questionnaire of teachers	DSM IV	6.80%	3.20%	0.60%	2.90%				
7	Guevara, et al (2001)[9]	57,216	Age 3-17 yrs	Community	Westen Washington, USA.	Data collection	ICD 9	5.20%	No data	No data	No data	3:01			
8	Gadow KD, et al (2000)[22]	300	Age 10-12 yrs	Community	Kyiv, Ukraine	Interview teachers	DSM IV	Ukraine 19.8%, USA 9.7%	Ukraine 7.2%, USA 6.5%	Ukraine 8.5%, USA 1.6%	Ukraine 4.2%, USA 1.6%	2.5:1	No effect	92%	
9	Wasserman RC, et al (1999)[23]	21,065	Age 4-15 yrs	Community	USA, Puerto Rico, 4 provinces in Canada	Interview mothers and children, school reports	DSM IV	9.20%	No data	No data	No data	3:01	No effect	95.5%	

LD = learning disability, MR = mental retardation, ADHD = attention deficit hyperactive disorder, ADHD-HI = hyperactive-impulsive subtype of attention deficit hyperactivity disorder, ADHDI = in attentive subtype of attention deficit hyperactivity disorder, ADHD-C = combined subtype of attention deficit hyperactivity disorder, *Significant difference between boys and girls.

achievements for each student were reviewed. Consent for studying was asked from each family. All students were administered Raven's progressive matrices test in small groups for screening of intellectual disability and were observed for their behaviors in the classrooms by a researcher. Students whose parents did not answer the Conners parent rating scales were excluded. Students who were not scored by the teachers but their parents returned the Conners were still included. 81.5 per cent of parents sent back the Conners scale. Thus, there were 353 students included in the study. Students whose Conners rating scales were above than 1.5 SD were labeled as suspected ADHD. They were subjected to the second step investigation.

Second step

Parents of students with suspected ADHD were interviewed according to DSM IV criteria for ADHD and students were interviewed and behaviorally observed individually for more information. They were also evaluated by a neurologist.

Criteria for diagnosing ADHD

By using diagnostic criteria from DSM IV, the essential features are short attention span, distractibility, hyperactivity and impulsivity[17]. The features had to be pervasive at least 2 in 3 settings (at home, at school and at a clinic or observed by a researcher).

Learning disability evaluation

All students were assessed for their reading skills by using a Thai language screening test that was developed on the basis of the phonological awareness deficit adapting from the concept in English language. The students with reading difficulties were later evaluated in detail by a special educator.

Material

Conners parent rating scales and Conners teacher rating scales that were modified in Thai by Trankasombat U[15] and DSM IV criteria for diagnosing ADHD[17] were used in this study.

Statistical analysis

Analyses were performed using SPSS for window. One way ANOVA and *t*-test were used for continuous data and Chi-square (and Fisher exact test when appropriate) for categorical data. Odd ratios with 95 per cent confidence intervals were reported as measures of effect size. Statistical significance was determined by alpha set at 0.05.

RESULTS

Three hundred and fifty-three from 433 parents completed the questionnaires and Conners parent rating scales. The response rate was 81.5 per cent. The studied population was composed of 175 boys and 178 girls. The number of ADHD students was 23 or 6.5 per cent. Of this number, 11 were boys and 12 were girls. The prevalence of ADHD in boys was 6.3 per cent and the corresponding prevalence in girls was 6.7 per cent. The ratio of prevalence in boy : girl was 1:1.09. Within the ADHD group, 6 students or 1.69 per cent were hyperactive subtype, 13 students or 3.68 per cent were inattentive subtype and 4 students or 1.13 per cent were combined subtype (Table 2).

Basic characteristics of ADHD and non-ADHD group

Demographic data and clinical characteristics of the ADHD and non ADHD group were not significantly different except the mathematics scores as shown in Table 3. Academic scores in this study were composed of the Thai language and mathematics

Table 2. The prevalence of ADHD divided into subtypes.

	Number	Hyperactive		Inattentive		Combined		Total	
		n	%	n	%	n	%	n	%
Male	178	5	2.8	5	2.8	1	0.56	11	6.2
Female	175	1	0.57	8	4.58	3	1.71	12	6.86
Total	353	6	1.7	13	3.69	4	1.13	23	6.52

Table 3. Demographic data of ADHD and non ADHD groups.

Variable	Total	ADHD		Non ADHD		P-value
	348	Total	%	Total	%	
Mean age (yrs) (SD, range)		9.51 (1.63, 7-14)		9.56 (1.71, 6-13)		0.374
Family income (baht/mo)						
< 5,000	181	13	56.52	168	54.55	0.257
5,000-10,000	119	10	43.48	109	35.39	
10,000-30,000	25	0		25	8.12	
> 30,000	6	0		6	1.94	
Sex						
Male	175	11		164		
Female	178	12		166		
Father educational level						
Primary school	164	14	66.7	150	58.4	0.499
Secondary school	98	5	23.8	93	36.1	
Diploma	11	1	4.8	10	3.9	
Bachelor's degree	5	1	4.8	4	1.6	
Mother education level						
Primary school	200	14	66.7	186	67.9	1
Secondary school	81	7	33.3	74	27	
Diploma	10	0		10	3.6	
Bachelor's degree	4	0		4	1.5	
Mean birth weight (g) (SD, range)	284	3139.47 (447.39, 2,400-4,200)		2,978.6 (505.53, 1,300-4,500)		0.533
IQ (percentile)						
> 95	85	3	13	82	25.8	0.173
75-95	83	9	39.1	74	23.3	
25-75	137	8	34.8	129	40.6	
5 to 25	25	1	4.3	24	7.5	
< 5	11	2	8.7	9	2.8	
Score (mean) (SD, range)						
Thai	347	71 (12.05, 42-87)		74.5 (10.46, 42-57)		0.374
Mathematics	347	58.4 (13.95, 36-98)		67.8 (14.52, 30-98)		0.006**

** $p < 0.05$ for *t*-test

scores. Mean mathematics score in the ADHD group was 71 (SD 12.05, range 42-87) and in the non-ADHD group it was 74.5 (SD 10.46, range 42-57). This difference was statistically significant (p=0.006). Students with ADHD were 2.66 times more likely to have a mathematics score below 65 than those without ADHD (95% confidence interval = 1.10, 6.45, p= 0.03). From 23 ADHD students, 2 or 8.7 per cent had reading difficulties.

Physical and neurological examinations

All ADHD students were found to have normal physical and general neurological examination but abnormal soft neurological signs including sequential finger opposition, left-right discrimination and associated movement, were positive in 20 out of 23 (87%) students.

Basic characteristics of the drop-out students compared with the studied population

There was no significant difference of mean age, number of boys and girls between the drop-out students and the studied population. Within the two groups, the drop-out students had lower academic and IQ scores than the studied population with a statistical significance as shown in Table 4.

Three hundred and twenty-three (91.5%) students of the studied population and 48 (60%) of the drop-out group were scored by their teachers by using the Conners teacher rating scale (p=0.1). When

Table 4. Demographic data of drop-out and studied population groups.

Variable	Total	Studied group		Drop out group		P-value
		Total	%	Total	%	
Sex						
Male	223	175	49.6	48	60	0.1
Female	210	178	50.4	32	40	
IQ (percentile)						
> 95	96	86	25.1	10	15.6	0.013*
75-95	98	83	24.2	15	23.4	
25-75	163	138	40.2	25	39.1	
5 to 15	32	25	7.3	7	10.9	
< 5	18	11	3.2	7	10.9	
Score (mean ± SD, range)						
Thai	427	74.23 (10.59, 42-57)		66.96 (16.18, 3-93)		< 0.005**
Maths	427	67.10 (14.62, 30-98)		60.40 (14.31, 25-94)		< 0.005**
Mean age (SD) (yrs)	423	9.94 (1.85)		9.45 (1.72)		0.086
Teacher Conners scale						
Answer	377	323	91.5	48	60	0.1
No answer	62	30	8.5	32	40	
Teacher Conners scale						
Yes	354	280	88.2	54	91.5	0.115
No	43	38	11.8	5	8.5	

* $p < 0.05$ for χ^2 test, ** $p < 0.05$ *t*-test

Table 5. Comparison of the prevalence of ADHD between Wolraich ML, et al and Benjasuwantep B, et al from this study.

	Wolraich ML, et al (1996) (%)	Benjasuwantep B, et al (%)
Prevalence of ADHD (overall)	6.80	6.50
Prevalence of ADHD-I	3.20	3.69
Prevalence of ADHD-HI	0.60	1.70
Prevalence of ADHD-C	2.90	1.13

the score of more than mean plus 2 SD was used as the cut off point, 280 (88.2%) of the studied population were classified as positive cases compared to 54 (91.5%) of the drop-out group. However, the difference was not statistically significant (p=0.115) (Table 4).

DISCUSSION

Attention deficit hyperactivity disorder (ADHD) has been a well-studied disorder. There are several studies in many countries worldwide. In Thailand, there have been a few published papers about ADHD. Most of them were studies on the clinical reference population[14-16]. The only study of ADHD in a community was surveyed by Suvarnakieh K, et al[13]. The prevalence was reported to be 2.37 per cent, which was lower than the finding in the present study (6.5%). This may be because of the difference of recruitment criteria. Suvarnakieh K, et al started by selecting students with academic problems. The present study, like others, recruited all the students in the class[8,12,13,18-23]. Prevalence and subtypes of ADHD in the present study are comparable to the findings in the most recent study of Wolraich ML, et al (1998)(Table 5)[8]. Both studies had the same study design.

The ratio of boys and girls in the present study was 1:1.09. Given the community based design, this ratio is still lower than the others. The ratios in previous community based studies were in the range

of 2-5:1, while the clinical based studies had the ratio of 4-14:1. The explanation for the lower ratio in the present study is probably the higher prevalence of the inattentive subtype and girls were more likely to be inattentive.

The girls with ADHD in the present study were mostly of the inattentive subtype (3.68%) and this is almost the same number as reported in the study of Wolraich ML, et al (3.5%)[12]. Many studies found that girls with ADHD, especially in community based studies, were less severely affected (less hyperactive, had a lower rate of conduct disorder and other behavioral problems)[18,20,21,24-28]. The authors suggested that girls with ADHD in the community could be underdiagnosed. Parents, teachers and medical personnel should be aware that girls who only have inattention symptoms but are not hyperactive could possibly have ADHD and need help.

Allison ME, et al found that students with inattentive subtype of ADHD had more dyscalculia than those with the combined subtype[24]. In the present study, the students were not formally assessed for their mathematics skills but ADHD students had lower mathematics achievement scores than non-ADHD students.

There were 80 (19%) students whose parents did not answer the questionnaire and the Conners parent rating scale. They were classified as the drop-out group. The demographic data of the drop-out students was similar to the studied population except for the IQ and academics scores. The drop-out students had lower IQ and academic scores than the studied population with statistical significance. So it is possible that the academic problems in these ADHD students were less prevalent than they should be.

The limitation of the present study was that the studied populations was recruited from only one school with a relatively low socioeconomic status which does not represent the general population of students in Bangkok.

The authors concluded that ADHD is a common problem among primary school students. ADHD students in this study mostly had abnormal soft neurological signs, low mathematic scores and some had comorbid reading difficulties.

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ความชุกและลักษณะทางคลินิกของโรคซนสมาธิสั้นในนักเรียนประถม

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นิชรา เรืองดารกานนท์, พ.บ., พงษ์ศักดิ์ วิสุทธิพันธ์, พ.บ.**

โรคซนสมาธิสั้นเป็นปัญหาเรื้อรังที่พบได้บ่อย เด็กที่เป็นโรคซนสมาธิสั้นมักมีปัญหาการเรียนและปัญหาพฤติกรรม การศึกษาโรคซนสมาธิสั้นในประเทศไทยยังมีจำนวนไม่มากนัก และส่วนมากกลุ่มประชากรที่ใช้ศึกษาเป็นผู้ป่วยในคลินิกหรือโรงพยาบาลซึ่งไม่ใช่ตัวแทนของประชากรเด็กในสังคมทั่วไป คณะผู้วิจัยจึงทำการศึกษาโรคซนสมาธิสั้นในเด็กชั้นประถมปีที่ 1-6 โรงเรียนวัดเสมียนนารี กรุงเทพมหานคร จำนวน 433 คน โดยประเมินพฤติกรรมจากการใช้แบบสอบถามและ Conners rating scale การวัดระดับเชาว์ปัญญาเด็กโดยใช้แบบทดสอบ Raven's progressive matrices รวบรวมผลการเรียนของเด็กและสังเกตพฤติกรรมเด็กรายกลุ่มในห้องเรียน เมื่อพบว่าเด็กคนใดสงสัยเป็นโรคซนสมาธิสั้น จะทำการซักประวัติเด็กอย่างละเอียดจากผู้ปกครองและสังเกตพฤติกรรมเด็กเป็นรายบุคคล จึงทำการวินิจฉัยโรคโดยใช้เกณฑ์การวินิจฉัย DSM IV เด็กที่ผู้ปกครองไม่ตอบแบบสอบถามและ Conners rating scale จะถูกตัดออกจากการวิจัย ผลการศึกษาของเด็กที่ผู้ปกครองตอบแบบสอบถามจำนวน 353 คน (81.5%) พบเด็กเป็นโรคซนสมาธิสั้นจำนวน 23 คน เป็นเด็กชาย 11 คน เด็กหญิง 12 คน คิดเป็นความชุกของโรค 6.5% อัตราส่วนเด็กชายต่อเด็กหญิงเท่ากับ 1 : 1.09 เด็กที่เป็นโรคซนสมาธิสั้นมีคะแนนคณิตศาสตร์ต่ำกว่าเด็กที่ไม่ได้เป็นอย่างมีนัยสำคัญทางสถิติ ($p = 0.006$)

คำสำคัญ : โรคซนสมาธิสั้น, นักเรียนชั้นประถม

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