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Attention Deficit Hyperactivity Disorder in Primary School Chiang Mai, Thailand

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Abstract

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common childhood-onset neurodevelopmental disorders. The estimated prevalence of ADHD worldwide ranges between 0.1–8.1%. In Thailand, the prevalence was estimated between 4.2 -8.1%. Public awareness about ADHD is increasing, yet very few studies have been done. This descriptive study was undertaken to identify the risk situation of ADHD among primary school students. Data were collected using the Swanson, Nolan, and Pelham-IV rating scale (SNAP-IV) among parents and primary teachers of the classes. Descriptive statistical analysis, the Chi-square test, and Fisher's exact probability test were employed for data analysis. One hundred and nine students participated in the study, which consisted of 56 males (51.38%) and 53 females (48.62%). The risk situation of ADHD subtypes with the agreement of parents and teachers were inattention at 10.09% and hyperactivity at 5.50%. The risk situation of Oppositional Defiant Disorder (ODD) was 4.59%, with the parent-teacher agreement. Male students were more likely to be identified as at risk of ADHD symptoms inattention than female students ($p < 0.05$). In addition, the risk situation of ADHD and ODD was higher among students in lower levels of study ($p < 0.05$). These findings emphasize the importance of early screening of ADHD and also add to the existing literature by contributing data in understudied areas. These benefit schools and parents to plan for potential comprehensive interventions for the children at risk of ADHD.

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neurodevelopmental disorders of childhood and later becomes apparent in teenagers, per the DSM-5 (American Psychiatric Association, 2013). It develops in childhood and later becomes visible in the preschool and early school years. ADHD has been considered a life disability that significantly impaired cognitive, family, school, and psychosocial functioning. Literature from developed countries has shown that ADHD can harm many aspects of a child's life, including academic achievement (Pang et al., 2021). Patients with ADHD are at risk for developing comorbidities like oppositional defiant disorder (ODD), conduct disorder (CD), and depression (Joshi & Angolkar, 2021). According to the DSM-5 (American Psychiatric Association, 2013), diagnosis of ADHD requires a persistent pattern of inattention and/or hyperactivity

and impulsivity that interferes with function and development. The symptoms of ADHD negatively impact many aspects of individuals' lives, families, and society, including but not limited to, educational and social outcomes, strained parent-child relationships, and increased utilization of and spending on healthcare services. ADHD is diagnosed as one of three types: inattentive type, hyperactive/impulsive type, or combined type. A diagnosis is based on the symptoms that have occurred over the past six months.

The global prevalence of ADHD has been reported of 2.2% overall (range, 0.1–8.1%) has been estimated in children and adolescents (ADHD Institute, 2021). An epidemiological study of 20 countries from the World Health Organization World Mental Health Surveys found prevalence rates of ADHD in children and adolescents were highest in the USA (8.1%) and lowest in Iraq (0.1%) (Danielson et al., 2018). The Centers for Disease Control and Prevention estimated the figure of ADHD in the US as follows; 2.4 % of young children (2 to 5 years), 9.6% of school-age children (6 to 11 years), and 13.6 % of adolescents (12 to 17 years). The evidence suggested that boys are more likely to be diagnosed with ADHD than girls (12.9% and 5.6%, respectively) (Danielson et al., 2018). Gender differences regarding the clinical symptoms of ADHD are a higher level of hyperactivity and impulsivity in boys and higher levels of attention deficits in girls (Klefsjö, Kantzer, Gillberg, & Billstedt, 2021). However, recent studies suggested that ADHD affects a greater number of girls than previous reports and shows a similar comorbidity pattern to boys, which may reflect a general prejudice in the diagnostic method (Brandt, Napoleone, & Patalay, 2021; Mowlem et al., 2019). The causes and risk factors of ADHD are still unclear, which scientists considered the link with genetics, brain injury, exposure to environmental risks during pregnancy or at a young age, alcohol and tobacco use during pregnancy, premature delivery, or low birth weight (Faraone et al., 2021). The national prevalence of ADHD using screening test of SNAP-IV Thai version and interview by child and adolescent psychiatrists using DSM-IV TR among Thai students was reported at 8.1% in 2012. The incidents rate in boys (12%) was substantially higher than in girls (4.2%). The combined type of 3.8% and the hyperactive/impulsive type were the lowest equal to 0.9% (Visanuyothin, Pavasuthipaisit, Wachiradilok, Arunruang, & Buranasuksakul, 2013).

The ADHD diagnosis in clinical practice is based on the criteria described in the Diagnostic and Statistical Manual of Mental Disorders, fifth revised version, (DSM-5) (American Psychiatric Association, 2013). It is recommended to involve several informants (e.g., teachers, parents) and instruments (e.g., rating scales, neuropsychological tests) in the diagnosed assessment of ADHD. The recommended treatment of ADHD is to apply a complement approach including medication, behavioral therapy, cognitive therapy, psychosocial, and educational intervention. The treatment should be individually adapted and include the child, family, school, and other concerned (Felt, Biermann, Christner, Kochhar, & Harrison, 2014). In most cases, the combination of behavior therapy and medication is the most effective treatment for ADHD. For preschool-aged children with ADHD, behavior therapy, particularly training for parents, is recommended as the first line of treatment, including close monitoring, follow-ups, and adjusting before medication is tried (Ayano, Yohannes, & Abraha, 2020; Wolraich et al., 2019). The evidence suggested that some students at this local school faced difficulties focusing on their studies and were unable to complete tasks in time. It is hard for the individual to follow instructions or conversations. The individual is easily distracted or forgets details of daily routines. Many students exhibited an unusually high level of activity or excitement, sometimes fidgeted, and talked a lot. It is hard to sit still for long, especially while doing assignments. Some may run, jump, or climb constantly. Someone impulsive may interrupt others a lot, grab things from people, or speak at inappropriate times. It is hard for the person to wait their turn or listen to directions. Individuals with impulsiveness often had accidents and injuries. This situation impacts students, families, and schools. (School principal, personal communication, February 24, 2020). Yet, there is little understanding of this situation; only a few studies have been done.

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Therefore, this study aimed to examine the prevalence and correlates of ADHD symptoms among school-age children in rural Thailand. To achieve this goal, there were two specific objectives of this study; to identify the risk situation of ADHD in primary school students and to examine correlations between demographic characteristics and ADHD symptoms.

Materials and methods

This descriptive study was undertaken to identify the risk situation of ADHD among primary school children in Thailand. The participants consisted of 109 students (Grade 1 to 6, aged between 6 and 12 years) from Ban Donkaew School, a primary school under sub-district administration organization (SAO) in Chiang Mai province, Thailand in 2018. Since evidence suggested the risk situation of ADHD in this school, this study was interested in exploring to see if there is a trend and applying findings to the students. Therefore, this study used the whole population dataset. The inclusion criteria were 1) parents who were primary caregivers of the children, and 2) teachers and parents of primary school children who gave consent to participate in this study. This study employed the Thai version of SNAP-IV developed by Pityaratstian, Booranasuksakul, Juengsiragulwit, & Benyakorn (2014), translated from the Swanson, Nolan, and Pelham Questionnaire (SNAP-IV), 26-item rating scale (Swanson, 1992; Swanson, Wigal, & Lakes, 2009). The Thai version of SNAP-IV is a valid and reliable screening tool for ADHD with positive reliability (Cronbach's alpha = 0.93-0.96). Items of the SNAP-iv scale are consistent with the DSM-IV criteria for ADHD, including two subsets of symptoms: Inattention (items 1–9) and Hyperactivity/Impulsivity (items 10–18). Also, criteria for oppositional defiant disorder (ODD) are included (items 19–26) as ODD is often present in children with ADHD (Swanson, 1992; Swanson et al., 2009). The scores in each of the three subsets (inattention, hyperactivity/impulsivity, and opposition/defiance) are computed with suggested scoring guidelines for the Thai version SNAP-IV (parent) is 16-14-12; Thai SNAP-IV (teacher) is 18-11-8. The psychometric properties of the Thai version of this scale also have been validated for use among children aged 6–17 years in Thailand (Pityaratstian et al., 2014).

Data collection was conducted from January to February 2018, the parents of children and the primary teachers of the classes administered SNAP-IV on the students under their supervision to observe the child's behaviors. Permission to conduct this study was approved by the school principal. The researchers explained the purpose of this study to parents who attended the parents-school meeting. The consent forms and questionnaire were distributed to parents, which were collected during the session or later by the school, additional forms completed by parents who could not attend the meeting were also collected. The incomplete forms from parents were sought out for clarification before being analyzed. The same procedure was used for questionnaires distributed to the teachers.

Data analysis

Descriptive statistics were used for statistical analysis. The Chi-square test for independence was used for categorical variables. In cases with a low expected cell frequency, correction with the Fishers' Exact Probability Test was considered.

Results

Demographics

The summary statistics for the total 109 participants present that about half of them (50.46%) were male, and 49.5% were female. About 60% of participants studying in the lower primary level (Grade 1-3), and 41.28 % were in the upper level (Grade 4-6). The majority (22.02%) were in Grade 1 and 6, flowing by 19.27% in Grade 3, illustrated in Table 1.

Table 1: Distribution of participants according to demographic data.

Demographic data		n	%
Gender			
	Male	55	50.46
	Female	54	49.54
Year of Study			
	Grade 1	24	22.02
	Grade 2	19	17.43
	Grade 3	21	19.27
	Grade 4	13	11.93
	Grade 5	8	7.34
	Grade 6	24	22.02
Total		109	100.00

ADHD Score by SNAP-iv scale

ADHD Score of participants rating SNAP-iv scale by parents and teachers illustrated in Table 2. Regarding parents' observation, the score of ADHD with inattention predominant symptom was slightly higher than hyperactivity/ impulsivity predominant, 8.95±5.23 versus 7.70±5.27). The ODD score was reported as 7.62±4.68. Likewise, teachers reported a higher score of inattention predominate than hyperactivity/ impulsivity, 8.86±6.23 and 5.76±4.53, respectively), whereas the ODD score was 5.05±4.57.

Table 2: ADHD Score of SNAP-iv scale by parents and teachers.

Informant	Gender	Inattention		Hyperactivity/ Impulsivity		ODD	
		Mean	SD	Mean	SD	Mean	SD
Parents	Male	8.80	5.09	7.49	4.89	7.62	4.60
	Female	9.11	5.41	7.91	5.68	7.63	4.81
	Total	8.95	5.23	7.70	5.27	7.62	4.68
		min-max = 0-27		*min-max = 0-27*		*min-max = 0-22*	
Teachers	Male	10.78	7.04	6.82	5.27	5.36	4.52
	Female	6.91	4.56	4.69	3.32	4.72	4.64
	Total	8.86	6.23	5.76	4.53	5.05	4.57
		min-max = 0-27		*min-max = 0-23*		*min-max = 0-19*	

Risk situation of ADHD

Risk situation of ADHD among these students was derived based on scoring, cutoffs, and agreement between the informants as shown in Tables 3 to 7.

Risk situation of ADHD with the agreement

Risk situation was derived based on scoring, cutoffs, and agreement between the informants as shown in Table 3. The findings of this study revealed the prevalence rate of inattention predominate subtype as 10.09% whereas the prevalence of hyperactivity subtype was 5.50%. The prevalence of ODD was 4.59%.

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Table 3: Distribution of children rate as ADHD by parents and teachers.

ADHD Subscale		n	%
ODD	Inattention with agreement	11	10.09
	Inattention with partly agreement	10	9.17
	Hyperactivity with agreement	6	5.50
	Hyperactivity with partly agreement	19	17.43
	ODD with agreement	5	4.59
	ODD with partly agreement	25	22.94
Total		109	100.00

Risk situation of ADHD by gender

Table 4 presents the portion of students at risk of ADHD and subscales with a comparison of the prevalence of ADHD by gender identified by parents and teachers. Regarding the parents' observations, 13 students (11.93%) were identified as at risk of inattention predominated whereas 17 students (15.60%) were identified as at risk of hyperactivity/ impulsivity, finally 9 students (8.26%) showed combined ADHD. The results showed that parents viewed being male students were more likely than females to have inattention, hyperactivity, and combined symptoms. In addition, symptoms of ODD were found a higher rate in male than female students. From the teachers' views, there were 16 students (14.67%) being identified as at risk of inattention, 14 students (12.84%) showing hyperactivity/impulsivity predominant, and a total of 7 students (6.42%) being recognized combined ADHD. Remarkably, about one-fifth of the students were identified as at risk of ODD from both parents' and teachers' perspectives. It is obviously reported that male students were far more at risk than females in all subtypes of ADHD ad ODD from teachers' perspectives.

Table 4: Distribution ADHD predominate types by gender from parents and teachers' observations.

Informant	Gender	Inattention	Hyperactivity/ Impulsivity	Combined	ODD
		n (%)	n (%)	n (%)	n (%)
Parents	Male	8 (7.34)	9 (8.26)	5 (4.59)	13 (11.93)
	Female	5 (4.59)	8 (7.34)	4 (3.67)	9 (8.26)
	Total	13 (11.93)	17 (15.60)	9 (8.26)	22 (20.18)
Teachers	Male	14 (12.84)	11 (10.09)	7 (6.42)	13 (20.18)
	Female	2 (1.83)	3 (2.75)	0 (0.00)	9 (8.26)
	Total	16 (14.67)	14 (12.84)	7 (6.42)	22 (20.18)

Risk factors

From parents' observation, the results show significant differences in the portion of students at risk of ADHD and subtypes by demographic characteristics. Specifically, the results show a correlation of ADHD symptoms at risk of inattention among students in the lower level, grade 1-3 (17.19%) compared with the upper level, grade 4-6 (4.44%) ($\chi 2 = 4.047$, $p < 0.05$). The prevalence of ADHD symptoms at risk of hyperactivity also was higher among lower primary level students (21.88%) than upper-grade students (6.67%) ($\chi 2 = 4.600$, $p < 0.05$). In addition, students in the lower level were more likely to be identified as at risk of ODD, compared to students in the upper primary level (28.13% versus 8.89%; $\chi 2 = 21.3$, $p < 0.05$). However, there was no statistically significant difference in ADHD symptoms between boys and girls from their parents' view (Table 5). Results from teachers' perspectives were described in Table 6. There were significant differencesin the portion of students at risk of ADHD and ODD by demographic characteristics. Male students were more likely to be identified as at risk of ADHD symptoms predominate inattention as

compared to female students (25.45% versus 3.70%; $\chi2 = 10.293$, $p < 0.01$); at-risk of hyperactivity (20% versus 5.56%; $\chi2 = 5.078$, $p < 0.05$); and at-risk of combined ADHD (12.73% versus 0%; $\chi2 = 7.344$, $p < 0.05$). Students with lower levels of study were more likely to be identified as at risk of ODD as compared to students with upper grade (28.13% versus 8.89%; $\chi2 = 6.013$, $p < 0.05$). Yet, there was no statistically significant difference of ADHD symptoms between study levels from teachers' views.

Table 5: Prevalence of ADHD subtypes by Demographics rated by parents.

Characteristic	Total	At-risk of Inattention	χ2	p-value	At-risk of Hyperactivity [n (%)]	χ2	p-value
Full sample	109	13 (11.93)			17 (15.60)		
Gender			0.725a	.397		0.050	.824
Male	55	8 (7.34)			9 (8.26)		
Female	54	5 (4.59)			8 (7.34)		
Study level			4.047a	.044		4.600a	.032
Grade 1-3	64	11 (17.19)			14 (21.88)		
Grade 4-6	45	2 (4.44)			3 (6.67)		
Characteristic	**Total**	**At-risk of Inattention**	**χ2**	**p-value**	**At-risk of Hyperactivity [n (%)]**	**χ2**	**p-value**
Full sample	109	9 (8.26)			22 (13.76)		
Gender			0.367a	.367		0.102	.751
Male	55	5 (4.59)			13 (11.93)		
Female	54	4 (3.67)			9 (8.26)		
Year of Study			3.651a	.056		6.013a	.014
Grade 1-3	64	8 (12.50)			18 (28.13)		
Grade 4-6	45	1 (2.22)			4 (8.89)		

Table 6: Prevalence of ADHD subtypes by Demographics rated by Teachers.

Characteristic	Total	At-risk of Inattention	χ2	p-value	At-risk of Hyperactivity [n (%)]	χ2	p-value
TOTAL	109	16 (14.67)			14 (12.84)		
Gender			10.293a	.001		5.078a	.025
Male	55	14 (25.45)			11 (20.0)		
Female	54	2 (3.70)			3 (5.56)		
Study level			0.047a	.829		2.589a	.108
Grade 1-3	64	9 (14.06)			11 (17.19)		
Grade 4-6	45	7 (15.56)			3 (6.67)		
Characteristic	**Total**	**At-risk of Inattention**	**χ2**	**p-value**	**At-risk of Hyperactivity [n (%)]**	**χ2**	**p-value**
TOTAL	109	7 (6.42)			22 (20.18)		
Gender			7.344a	.007		0.822a	.367
Male	55	7 (12.73)			13 (23.6)		
Female	54	0 (0.00)			9 (16.7)		
Year of Study			0.008a	.931		6.013a	.014
Grade 1-3	64	4 (6.2)			18 (28.13)		
Grade 4-6	45	3 (6.7)			4 (8.89)		

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Discussion

The findings of this study reported the risk situation of ADHD with the agreement of parents and teachers as inattention at 10.09% and hyperactivity at 5.5% using the Thai version of SNAP-IV but not yet diagnosed. This study showed the trend of risk situation of ADHD relevant to the worldwide prevalence as range, 0.1–8.1% (ADHD Institute, 2021) and inconsistency with the study 2% and 17% (Canals, Morales-Hidalgo, Jané, & Domènech, 2018). This study found that the parents' score of ADHD with inattention, hyperactivity/ impulsivity, and ODD was slightly higher than the teachers, similar to the study from India (Joshi & Angolkar, 2021). Therefore, the Thai version of SNAP-IV should be used as primary screening for the risk of ADHD and subsequent diagnosis. The difference between rating scores by parents and teachers could be described by the environmental differences between school and home. In school, there are specific rules for students' behavior regulation. Behavior pattern such as "often leaves seat during the class or in other situations in which remaining seated is expected" would be observed more easily. The number of students in classes may result in difficulty observing the behaviors of individual students. This may be the reason for the lower score of ADHD is reported by teachers. Besides, behavior patterns like "often is forgetful in daily activities" would be more noticed at home rather than in school. These may be due to the free behaviors of children or different house rules.

From this study, students in lower levels of study (grade 1-3) tended to be at risk in subtypes of ADHD and ODD from both parents and teachers observations (12.5%, and 6.2%, respectively), which is consistent with the literature as reporting 9.6% of school-age children (aged 6 to 11 years) experiencing ADHD symptoms (ADHD Institute, 2021). This can be explained as ADHD is a developmental disorder that involves delays in how well a person can control, or regulate, his or her attention, behavior, and emotion. ADHD changes in children as they grow and develop. Generally, the chronic nature of ADHD, symptoms, and impairment often change over time. For example, hyperactive symptoms tend to decline the most, usually in later childhood and early adolescence. Inattentive symptoms of ADHD appear the most stable over time and attention span may improve gradually with age. Impulsive behaviors, on the other hand, may become more serious (Nationwide Children's Hospital, 2018). Therefore, symptoms of ADHD were more likely to be noticed in early childhood, especially with the closed supervision of parents. Male students were more likely to be identified as at risk of symptoms predominate inattention compared to female students, which are in line with a previous study reporting gender differences regarding the clinical symptoms of ADHD (Klefsjö et al., 2021). However, concerning the subtypes of ADHD from parents' views, there was no significant gender difference between males and females, consistent with a study done in India (Joshi & Angolkar, 2021). ADHD may be inaccurately classified in females because the symptoms tend to be more noticeable in males than females, which may cause a general bias in the diagnostic process (Mowlem et al., 2019). The prevalence reported in this study supports the existing literature for using parents and teachers scales for ADHD screening. Therefore, it might be more practical to consider the results not only the scores of the rating scale and cutoffs but also the level of agreement between teachers and parents about the presence of the symptoms of ADHD.

Conclusion

This study estimated 5.5% ADHD risk situation in primary school children of the local school with the agreement of parents and teachers. The ADHD rating scale used in this study is a screening scale rather than a diagnostic test the results indicate the percentage of children at risk of ADHD, rather than those who have been formally diagnosed. This finding also adds to the existing literature by contributing data in understudied areas and helping in early screening and planning for potential comprehensive treatments.

Recommendation

This study design was cross-sectional, which limited our ability to draw causal inferences. Thus, a longitudinal study should be conducted in the future to

examine the causal relationship between ADHD symptoms and academic performance as well as the long-term effects of ADHD on academic achievement. While data from this study cannot be generalized to other schools, the information is beneficial in reminding teachers and parents to be vigilant of any consistent disruptive students' behaviors and undertake an appropriate intervention action without delay.

Limitation

The limitation in this study was that only one local school was included using the SNAP-IV rating scale rather than a diagnostic test. Parents and teachers measure may underestimate ADHD symptoms for our sample. Interpretation of the results should be done considering some methodological limitations used only respondent-based rating scales, not clinical interviews. Also, the sample is not representative of the country as a whole as it includes urban areas only.

Ethics

This study was approved by the Ethical Review Board of Boromarajonani College of Nursing, Chiang Mai. The study follows the international guidelines for human research protection mentioned in The Declaration of Helsinki and The Belmont Report: ERB No. BCNCT11/2561.

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Conflict of interests: The authors declare that they have no conflict of interest.

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