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Prevalence of ADHD and factors for parent's participation in the care of children with ADHD, Yasothon, Thailand

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Abstract:

BACKGROUND: Attention deficit hyperactivity disorder (ADHD) is a mental health disorder commonly observed in children. Parents' participation in the care (PPC) of children with ADHD (C-ADHD) is especially important to promote support care and treatment. We estimated the prevalence of C-ADHD and identified the factors for the PPC of C-ADHD.

METHODS AND MATERIALS: A cross-sectional analytic study was conducted on parents and grade-one students in five primary schools, Muang district, Yasothon, Thailand. The study was conducted from March to June 2022. Data were collected using the screening test of SNAP-IV Thai version and by interviewing child psychiatrists and parents. Descriptive statistics were used to summarize the demographic data and prevalence of C-ADHD. Unconditional multiple logistic regression was used to identify predictive statistical model for the PPC of C-ADHD.

RESULTS: Four hundred sixty-four students were screened by SNAP-IV, of which 30 students were confirmed as ADHD (6.5% [95% confidence interval [CI]: 4.4–9.1]), with 9.1% boys and 3.6% girls. Four factors associated with the PPC of C-ADHD significantly including male (ORadj: 2.5, 95% CI: 1.4–4.4), single divorce status (ORadj: 2.1, 95% CI: 1.1–4.2), income more than 15,000 baht (ORadj: 3.1, 95% CI: 1.8–5.1), and attitude level during middle-high (ORadj: 8.4, 95% CI: 5.0–14.2). Predictive factors of four variables can be used to implement the policy to improve the healthcare system, prevention, and PPC of C-ADHD.

Keywords:

ADHD, factors, parent's participation, prevalence

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a chronic neurobehavioral disorder and is often associated with serious areas of impairment and comorbidities over a life span. It is clinically diagnosed based on symptomatology and evidence provided by the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5).^[1] On a global scale, it affects 5–8% of children, mostly boys, and often

lasts into adulthood. ADHD affects a child's learning and daily functions. It has three main features: inattention, hyperactivity, and impulsivity.^[2] A mean worldwide prevalence of approximately 2.2% (range, 0.1–8.1%) has been estimated in children and adolescents (aged <18 years) (ADHD Institute). Estimates of the administrative prevalence (clinically diagnosed or recorded) vary worldwide and have been increasing over time.^[3] ADHD often persists into adulthood and is a risk factor for other mental health disorders and negative outcomes, which include educational

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underachievement, difficulties with employment and relationships, and criminality. The timely recognition and treatment of children with ADHD-type difficulties provide an opportunity to improve long-term outcomes.^[4]

The Swanson, Nolan, and Pelham Rating Scale (SNAP-IV) is a widely used scale that measures the core symptoms of ADHD.^[5] The questionnaire is used by parents and teachers.^[6] They can screen and provide inceptive aid and referrals to the public health system in the student support system program that the Department of Mental Health founded and continues to operate.^[7] However, to establish an effective intervention, it is important to identify the factors associated with ADHD symptoms. Several studies^[8,9] have revealed factors associated with ADHD symptoms such as child factors and parent factors. Therefore, parent's participation in the care (PPC) is important to solve C-ADHD. Previous studies revealed methodological differences and up-to-date measurement such as, the age of the child at screening and diagnosis, tools for screening C-ADHD. Given the wide variability in the prevalence of ADHD and the lack of knowledge of factors associated with PPC of C-ADHD, parental involvement will support health workers in delivering an effective healthcare provision for C-ADHD. If parents accepted and participated in all activities with their children, there will be a continuous care system for C-ADHD consisting of screening, diagnosis, treatment, and participatory care.

Subjects and Methods

Study design and setting

A cross-sectional analytic study was carried out with parents and their grade-one level children in five primary schools, Muang district, Yasothon, Thailand. It aimed to estimate the prevalence of C-ADHD and identify the predictive statistical model for PPC of C-ADHD. The study was conducted from March to June 2022.

Study participants and sampling

The sample size was 473 participants assuming a prevalence of 8.1% of C-ADHD. The sample size was derived using the Cochran WG's formula,^[10] which estimates the population proportion from the finite population using the following formula: $(n^0 = Z2\alpha/2Q/r2P, n = n^0/1 + n^0/N), n^0 = 320$. Simple random sampling was carried out without replacement. The PPC of C-ADHD studies the conduct of student's parents. This study aims to determine which of the parents—the father or mother (who gives birth to the child)—played a critical role in the nurturing of the child. The role of a guardian is important here who has stayed with the child for more than 1 year (including the current year) in the same house as the child. The study also determines if sufficient listening and speaking skills in the Thai

language were utilized and if written informed consent was obtained.

Data collection tools and technique

The screening test for C-ADHD was applied using the standard instrumentation of the Department of Mental Health. The questionnaires consisted of two sections: 1) demographic data of students and 2) ADHD behavior assessment form SNAP-IV 26-Item (Short Form). The questionnaires to investigate the students' parents consisted of five sections: 1) demographic data of parents, 2) knowledge of C-ADHD, 3) perceptions about C-ADHD, 4) attitudes about C-ADHD, and 5) PPC of C-ADHD. Development and psychometric testing of the questionnaire were conducted. In this study, a content validity assessment was performed by six experts. The content validity index (CVI) of each item was between 0.83 and 1.0 and the CVI of the scale was 0.99. Cronbach's alpha of knowledge, perceptions, attitudes, and PPC of C-ADHD ranged from 0.74 to 0.94.

PPC of C-ADHD was performed using the questionnaires. The prevalence of C-ADHD was conducted in the following two steps: the first step was carried out using the screening test of the SNAP-IV Thai version; it was conducted by parents and homeroom teachers to identify the children at risk. Children behavior assessment form by SNAP-IV (Short Form), the Thai version of which consisted of 26 questions was classified into three symptoms: 1) inattention (items 1–9, total score 27), 2) hyperactivity/impulsivity (items 10–18, total score 27), and 3) oppositional defiant disorder (ODD) (items 19–26, total score 24). Symptom severity is rated on a 4-point scale. Responses were scored as follows: not at all = 0, just a little = 1, quite a bit = 2, and very much = 3. Children at risk were those who had an assessment from one of the parents or teachers and the score was greater than or equal to the standard score of one of three symptoms. For inattention, the score was greater than or equal to 18 for teachers and 16 for parents. For hyperactivity/impulsivity, the score was greater than or equal to 11 for teachers and 14 for parents. For oppositional defiant disorder, the score was greater than or equal to 8 for teachers and 12 for parents. In the second step, children at risk were interviewed by psychiatric nurses, after which the C-ADHD was confirmed by child and adolescent psychiatrists.

Data analysis and statistics

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software, version 18.0 (SPSS[®], Chicago, USA). Descriptive statistics was used to summarize the demographic data and prevalence of C-ADHD. The PPC of C-ADHD, knowledge, perceptions, and attitudes score were classified into two levels suggested by Bloom *et al.*,^[11] 60% or more scores were

“medium-high group,” and less than 60% scores were “low group.” Unconditional multiple logistic regression was used to identify the predictive statistical model for the PPC of C-ADHD. Independent (x) variables were sex, age, marital status, occupation, income, knowledge, perceptions, attitudes, and experience in the care of C-ADHD. The dependent variable (y) was the PPC of C-ADHD from the “low group” and “medium-high group.” The Chi-square test was used to evaluate the bi-variate relationship between dependent and independent variables. Independent variables were selected with a *P* value set at <0.25, suggested by Hosmer and Lemeshow,^[12] and subjected to the initial regression model of multivariate analysis. Before conducting the multiple logistic regression, which was an assumption test to include multi-collinearity by variance inflation factor (VIF) and interaction effect that revealed all independent not violated assumptions. The model was fitted by the backward elimination technique, with the research keeping only the significant variables in the final model. After that, a test model was discharged by the Hosmer–Lemeshow goodness-of-fit test. The identified cut-off point for the model’s precision in predicting factors for the PPC of C-ADHD was a used area under the receiving operating characteristics (ROC) curve. A *P* value <0.05 was considered significant.

Ethical consideration

The Human Research Ethics Committee of the Mahasarakham University, Date Approved: February 18, 2022 and Date Closed: February 17, 2023 (protocol number 056-413/2565) approved the study.

Results

All 464 students were screened by SNAP-IV. Thirty-six (*n* = 36) students in the risk group were tested by child psychiatrists using DSM-IV, as pre-screening by a child and adolescent psychiatric nurse was not a criterion. Thirty (*n* = 30) cases were confirmed ADHD (6.5% [95% CI: 4.4–9.1]). The prevalence of ADHD among boys (9.1%) was higher than for girls (3.6%). The other six cases were not confirmed. Details of C-ADHD are shown in Table 1.

Of the 373 student’s parents, the majorities were female (71.1%), 30–49 years old (75.6%) (median: 37, minimum: 22, maximum: 69), married (81.8%), trade/ personal business (23.3%), and income lower than 15,000 baht or approximately 3000 USD/month (56.8%). Parent’s participation in the care (PPC) of children with C-ADHD is ranked at the medium-high level (58.7% of responses), with 56% of female parents and 68% of male parents ranking PPC at the medium-high level. With regard to the experience of caring for C-ADHD, 9.8% of female parents and 4.6% of male parents made that claim.

Table 1: C-ADHD’s characteristics

C-ADHD’s Characteristics	<i>n</i>	%
Type of C-ADHD		
Inattention	6	20.0
Hyperactivity	6	20.0
Inattention and hyperactivity	18	60.0
Living		
Live with parents	24	80.0
Live with grandparents	6	20.0
Parent’s occupation		
Agriculture	2	6.7
General employee	5	16.7
Company employee	3	10.0
Trade	11	36.6
Civil servants, government employees	5	16.7
Other	4	13.3
Parent’s monthly income (Baht)		
<15,000	12	40.0
≥15,000	18	60.0

Bivariate analysis for selected independent variables into the initial regression model of multivariate analysis found eight variables with *P* value <0.25, and all variables had variance inflation factor (VIF) value <10, as shown in Table 2.

In the multivariate analysis by unconditional multiple logistic regression, the final model found four factors associated with the PPC of the C-ADHD, including males (adjusted OR: 2.5, 95% CI: 1.4–4.4), single or divorced status (adjusted OR: 2.1, 95% CI: 1.1–4.2), income below 14,999 baht (adjusted OR: 3.1, 95% CI: 1.8–5.1), and attitude level during middle-high (adjusted OR 8.4, 95% CI: 5.0–14.2), as shown in Table 3.

In the model testing using the Hosmer–Lemeshow goodness-of-fit test (GOF), the *P* value was 0.211, and the area under the receiver operating characteristics (ROC) curve was 77.8 (95% CI: 73.0–82.7). At the cut-off-point of 0.386, the sensitivity was 84.9%, the specificity was 61.7%, and the accuracy was 95.5%, as shown in Figure 1.

For the predictive model of five variables, it can be predicted that the PPC of the C-ADHD was $P(Y = 1/X) = 1/[1 + \text{EXP}(-2.41 + 0.92 \text{ sex (male)} + 0.34 \text{ status (single or divorced)} + 1.12 \text{ income (<14,999 bath)} + 2.13 \text{ attitude (middle-height)}]$.

Discussion

The prevalence of C-ADHD in Yasothon, Thailand, was 06.5%. Comparable data from the World Health Organization (WHO) showed a prevalence of C-ADHD at 5–8%^[2] and in China, the prevalence of C-ADHD is 6.2%.^[13] The rate was lower than that in the United States 9.2%^[14] India 11.8%^[15] Egypt 20.5%,^[16] In Saudi

Table 2: Factors associated with PPC of the C-ADHD (bivariate analysis) (n=373)

Factors	n	PPC of the C-ADHD ^a n (%)	Crude OR	95% CI	P
Sex ^b					0.027
Female	265	146 (55.1)			
Male	108	73 (67.6)	1.7	1.1, 2.7	
Age (year) ^b					
≤29	62	46 (74.2)			
30-49	282	156 (55.3)	0.4	0.2, 0.8	0.007
≥50	29	17 (58.6)	0.4	0.2, 1.3	0.137
Marital status ^b					0.015
Single divorce	305	170 (55.7)			
Married/together	68	49 (72.1)	2.0	1.1, 3.6	
Occupation ^b					
Trade/personal business	87	41 (47.1)			
Government Officer/employee	78	43 (55.1)	1.4	0.7, 2.5	0.305
General employee	77	57 (74.0)	3.2	1.7, 6.2	0.001
Company employee	69	38 (55.1)	1.4	0.7, 2.6	0.325
Agriculture	41	28 (68.3)	2.4	1.1, 5.3	0.027
Other	21	12 (57.1)	1.5	0.6, 3.9	0.412
Income (bath) ^b					0.001
<14,999	212	108 (50.9)			
≥15,000	161	111 (68.9)	2.1	1.4, 3.3	
Knowledge ^b					0.009
Medium-high	62	27 (43.6)			
Medium-high	311	192 (61.7)	2.1	1.2, 3.6	
Perceptions ^b					0.130
Medium-high	203	112 (55.2)			
Medium-high	170	107 (62.9)	1.4	0.9, 2.1	
Attitudes ^b					<0.001
Low	160	57 (35.6)			
Medium-high	213	162 (76.1)	5.7	3.7, 9.0	
Experience caring for C-ADHD					0.761
Never	342	200 (58.5)			
Ever	31	19 (61.3)	1.1	0.5, 2.4	

^aParent's participation in the care (PPC) of the children with Attention-Deficit Hyperactivity Disorder (C-ADHD). ^bvariables that P<0.25 into initial regression model of multivariate analysis

Table 3: Predictive statistical model for the PPC of C-ADHD (multivariable analysis by multiple logistic regression) (n=373)

Variables	Co-efficient	SE	Crude OR	Adjusted OR	95% CI for OR _{adj}		P
					Lower	Upper	
Sex (male)	0.92	0.28	1.7	2.5	1.4	4.4	0.001
Status (single divorce)	0.76	0.34	2.0	2.1	1.1	4.2	0.025
Income (>15,000 bath)	1.12	0.26	2.1	3.1	1.8	5.1	<0.001
Attitude (middle-height)	2.13	0.26	5.7	8.4	5.0	14.2	<0.001
Constants	-2.41	0.48	-	-	-	-	-

Arabia, the prevalence was measured at 3.4%,^[17] 4.4% in Shahroud^[18] and 4.6% in Vietnam^[19] These variations can be explained by the diversity of measurement tools and geographical and cultural characteristics between the countries. Differences in methodology may also explain the variations in the reported rate. However, the prevalence of C-ADHD in the Yasothon province is a serious health problem; it can produce a series of negative effects on children, adolescents, and even adults and place a serious economic burden on families

and society. Despite the recent data demonstrating a prevalence rate similar to that estimated from another study, the PPC of children with C-ADHD was mostly at the medium-high level (58.7%). The PPC of the male parent was higher than that of the female parent; however, female parents had more experience caring for C-ADHD than male parents. Their results showed the difference in PPC between females and males; healthcare workers can use this for planning to support the PPC of C-ADHD.

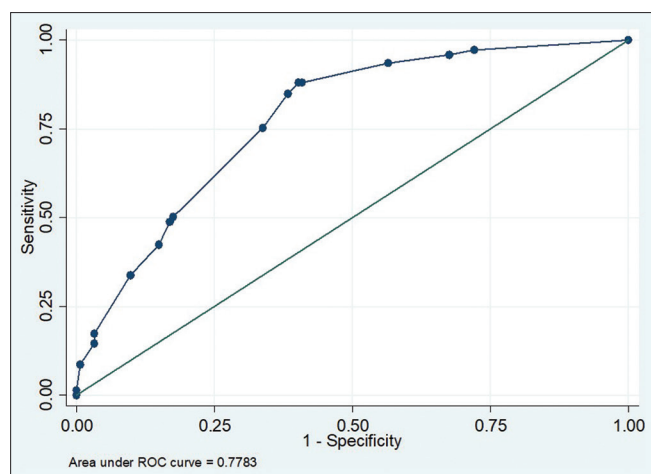


Figure 1: Area under the receiver operating characteristics (ROC)

The predictive model of four variables can predict the PPC of the C-ADHD significantly including males, single or divorced status, income more than 15,000 baht, and attitude level of middle-high. Rarely reported are factors affecting ADHD care.

Men are more likely to rank higher in the care of ADHD than women because the male gender may have higher self-esteem, a sharper focus on work, are eager to achieve greater success, and are more competitive than women. As expected by society,^[20] a man is often considered the head of the household.

Single and divorced parents had better scores on caring perhaps because parents who are widowed, divorced, or separated have to fend for themselves. Therefore, it is imperative to pay special care and attention to children. Acting in accordance with the context,^[21] playing the roles of both femininity and masculinity is necessary. Both male and female genders are suitable for the current social conditions.^[21]

Scores of higher income associated with better care are consistent with studies that revealed the interactions between comorbidities and income adequacy having different effects on healthcare needs.^[22] It is another factor that can predict the patient's health self-management behavior. If the income is high, it will be sufficient for daily living and self-management of health.^[23]

Attitude at middle-high level had PPC of C-ADHD better than who attitude at low level. This may be because a parent's positive attitude influences the behavior or expression in the care for ADHD. Therefore, educating and organizing activities for parents must continue. It will help parents to develop a positive attitude toward promoting health and ultimately result in good behavior under the true needs of the parents' family and community context.^[24] In addition, attitude is the strongest predictor

of the PPC of the C-ADHD. Nevertheless, the predictive factors of the four variables can be used to implement policies to improve the healthcare system and prevent and improve the PPC of C-ADHD.

Although, there are several factors in the care of C-ADHD, one of the most important factors is family income or its economic status to consider when designing its care. Therefore, the childcare system should be designed in accordance with the family situation and to attain the highest standards of care for the minimum cost for ADHD.^[25]

The Hosmer-Lemeshow goodness-of-fit test (GOF) and the analysis under the receiver operating characteristics (ROC) showed that all four variables were capable of effectively predicting the behavior of participants in the care of ADHD. A narrow 95% CI of the ROC reflected predictive accuracy. The sensitivity and accuracy were good. The specificity was at a fair level.^[26] However, the four-variable model could be applied in planning the promotion of parents' participation in the care of ADHD children.

Limitations and recommendations

Only grade-one students were recruited for this study. As such, the use of prevalence for comparison has to be considered further. This research is a sensitive issue. The communication skills of researchers and their assistants are of paramount importance. This included training in mental health counseling, along with a team of doctors and experts as consultants throughout the operation.

Conclusion

The prevalence of C-ADHD is a serious health problem and can produce negative effects on children and be a burden on society. Attitude is the strongest predictor of the PPC of C-ADHD. However, the predictive factors of the four variables can be used to implement policies to improve the healthcare systems and prevent and PPC of C-ADHD.

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Conflicts of interest

There are no conflicts of interest.

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