Attention-Deficit/Hyperactivity Disorder: Prevalence and risk factors in Egyptian primary School Children

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Abstract

OBJECTIVES: Attention-Deficit/Hyperactivity Disorder (ADHD) is one of the most common neurobehavioral disorders of childhood, which interferes with the social and educational development. This study aimed to determine the prevalence of ADHD among primary school children in Al-Qalyubia Governorate, Egypt, to identify underlying factors related to ADHD and to recommend a prevention and control program for this disorder. **METHODS:** A cross-sectional study was conducted on 921 students, aged 6-12 years, from four primary schools in Al-Qalyubia Governorate. ADHD was assessed using screening scales for teachers and parents. Underlying risk factors were investigated using a structured questionnaire filled by parents. **RESULTS:** The prevalence of ADHD among primary school children was 21.8% and 16.2% based on the teacher and parent scales respectively. The increased risk of ADHD was associated with child exposure to punishment, irritable parents' relation, poor parent-child relationship, watching TV, cyanosis and head trauma. ADHD was more likely in children with parental consanguinity and whose mothers were exposed to passive smoking during pregnancy. ADHD was less likely in urban children from high socioeconomic level. **CONCLUSIONS:** ADHD presents a troublesome problem among primary school children. Collaborative efforts are required to control risk factors associated with ADHD and to decrease its prevalence.

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Introduction

ADHD is the most common neurobehavioral disorder of childhood that is characterized by persistent hyperactivity, impulsivity and inattention [1].

The prevalence of ADHD ranges between 0.9% and 20%, which raises concerns about the consistency of estimates and the validity of diagnoses [2]. The overall prevalence of ADHD in children and adolescents between 1994 and 2010 ranged between 5.9% and 7.1 % [3]. In the United States, approximately 11% of children aged 4-17 years (6.4 million) were diagnosed with ADHD in 2011 [4].

In Egypt, few studies investigated the epidemiology of ADHD. The reported prevalence of ADHD among primary

school children ranged between 6.5% and 7.9% [5-8].

The chronic nature of ADHD means that it has a significant impact across many aspects of patient's life including social, academic, occupational functioning and quality of life. Moreover, ADHD can affect the lives of parents, carer givers or other family members by causing difficulties at home and putting strain on relationships [9;10].

To date no single factor has been identified as the cause of ADHD. ADHD is thought to be the result of complex interactions between genetic, environmental, and neurobiological factors [11].

Diagnosis of ADHD requires that the symptoms should be persistent and occurring in at least two settings such as home, school or community [12]. There are two main diagnostic tools in current use: the International Classification of Mental and Behavioral Disorders 10th revision (ICD-10) and the Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM IV) [13].

ADHD is most often referred by a teacher. Teachers provide objective description about the child's strengths and needs, the frequency and severity of the child's behavioral and/or academic difficulties, performance, social relations and general everyday functioning [14].

A multimodal treatment approach was recommended for ADHD. This comprised the administration of psycho-stimulants combined with educational and behavioral therapeutic measures. The choice of treatments is influenced by the presence of co-morbid disorder(s), level of impairment and family issues or concerns [15].

Early diagnosis and proper treatment can help individuals with ADHD to lead a successful life. However, without identification and proper treatment this disorder may have serious consequences, including school failure, depression, problems with relationships, substance abuse, delinquency, risk for accidental injuries, and job failure.

The specific objectives of this study were to estimate the prevalence rate of ADHD amongst the primary school children in Al Qalyubia Governorate, Egypt and to identify the relationship between ADHD and potential risk factors. In addition, the study aimed to outline a program for the prevention and control of this disorder.

METHODS

Participants: The minimum sample size (912) was calculated according the following equation:

$$\text{Sample size} = \frac{Z_{1-\alpha/2}{}^2 P(1-P)}{d^2}$$

Where
$Z_{1-\alpha/2}$= is the standard normal variate at 5% type 1 error (P<0.05); it is 1.96.
P= the expected proportion based on previous studies (6.5%) [8].
d= the absolute error (0.016)
The study participants comprised 921 students from four primary schools in Al-Qalyubia Governorate. These were recruited using the multi-stage sampling technique, which involved dividing Al-Qalyubia Governorate into clusters of ten districts. Of these, two districts were chosen by simple random sample (Shibin Al-Qanater and Tukh). From each district two primary schools were randomly included in the

study; one rural and one urban. Each school was divided into six strata reference to the six primary grades then one class from each grade was randomly chosen.

Instruments: The diagnostic scale for ADHD was previously developed, based on the DSM IV for ADHD, and validated (Cronbach's alpha= 0.7) in Egypt by El-Noby, 2005. It has a teacher copy and a parent copy. This comprised 24 items, 12 items for the inattention subtype and 12 items for the hyperactivity/impulsivity subtype. The combined subtype was considered when the child has scores for inattention and hyperactivity/impulsivity. Responses to questions on symptoms were coded as 1, 2 and 3 corresponding to doing this behavior *seldom, occasionally or always* respectively. The diagnosis is made when the subject had a score ≥48 of the maximum score which is 72 [16].

Data on personal information of students were also collected. These included gender, age, educational stage and residence. A structured questionnaire of risk factors related to ADHD was attached to the parent's rating scale to be filled at home. These risk factors were socioeconomic status, psychosocial factors and biological factors.

The socioeconomic status of students was assessed using a scale comprised seven domains with a maximum score of 84 and a higher score indicating better socioeconomic status. Socioeconomic scores were classified into three levels, scores *<42, 42 to 63 and 64 to 84* corresponding to *low, middle and high* social levels respectively [17].

The psychosocial factors included child living with both parents or a single parent, birth order, parents' relation, parent-child relationship, and parents' consanguinity [18-20].

The biological factors comprised perinatal and early life risk factors including toxemia of pregnancy, tobacco smoking, mother age at time of delivery, low birth weight, mode of delivery, cyanosis, head trauma, artificial feeding and daily time spent in watching TV [21-23].

Procedure: An approval from the Research Ethics Committee in Benha faculty of medicine was obtained. An approval from the Educational Administration of Al-Qalyubia Governorate was obtained and the field work was carried out during the academic year 2013/2014; from the start of October 2013 to the end of March 2014. The teachers and the parents were informed that all data included in the study will be confidential and the information will be only used for the research purpose.

For each student, a teacher questionnaire was filled by the corresponding class teacher and a parent questionnaire was sent in student's bag to be filled by parents.

Data analysis: The collected data were tabulated and analyzed using the computer programs SPSS (Statistical Package for Social Science) version 16.0 for windows, (SPSS Inc, Chicago,IL). Data for children who had completed both teacher's and parent's questionnaires were used for the analysis of risk factors.

The collected data were summarized in terms of mean ±SD and range for quantitative data and frequency and proportion for qualitative data. Statistical comparisons between the different study groups were carried out using univariate tests including the Chi-square test (χ^2), the Fisher Exact Test (FET) and the Student t-test (*t*) as appropriate. A P-value < 0.05 was considered statistically significant.

Multiple logistic regression analysis of being a case of ADHD based on the teacher rating scale and the parent rating scale was conducted based on the results from the univariate analysis. Factors that were associated with significant variations in the proportions of cases based on each scale were included in the preliminary models. Then non-significant factors were removed relying on a lowered P-value and if the Odd's Ratio (OR) of the remaining factors did not change. In the final model, the risk of being a case conditioned on residence, SES, child punishment, parent relation, parent-child relationship, parent consanguinity, passive smoking, watching TV and head trauma was tested and reported as (OR; 95%CI).

Results

The study included 921 students. The mean age of the studied sample was 11.63 ± 3.47 years and ranged between 6 and 13 years. The female students constituted 51.2% of the studied sample and 52.0% lived in rural area.

The prevalence of ADHD was 21.8% based on the teacher's rating scale and 16.2% based on the parent's rating scale. The combined subtype was the most frequent subtype based on both scales (Table 1).

Table 2 shows that the highest proportion of ADHD positive students diagnosed by the parent's rating scale was in those who belonged to low socioeconomic status followed by middle and high socioeconomic status (52.11%, 46.48% and 1.41% respectively; P<0.001). While the highest proportion of ADHD positive students diagnosed by the teacher's rating scale was in middle socioeconomic students followed by low and high socioeconomic status (53.41%, 42.05% and 4.55% respectively; P=0.001). Students who

were 2nd to 4th birth order were more likely to have ADHD (73.24% and 69.32% for the parent's scale and teacher's scale respectively) compared to those who were first or after the 4th birth order. Older students were more likely to have ADHD based on the teacher's rating scale (P= 0.003).

The prevalence of ADHD based on both scales showed highly significant variations (P<0.001) by the psychosocial characteristics of the studied students (Table 3). ADHD was more prevalent in students who were living with single parent, exposed to hitting, had irritable parents' relation and irritable parent-child relationship, had positive parent consanguinity and were living with smokers.

Table 4 shows increased prevalence of ADHD in children whose mothers had toxemia during pregnancy (71.43% and 78.57%) and had CS (26.27% and 29.66%) for the parent's scale and the teacher's scale respectively. Cyanosis, artificial feeding and head trauma were associated with increased prevalence of ADHD based on the parent's scale (75.0%, 32.53% and 41.03% respectively) and the teacher's scale (75.0%, 36.14% and 55.13% respectively). Watching TV was linked to increased prevalence of ADHD according to both scales at P<0.001.

Increased mother's age at the time of delivery was more likely in children who were positive for ADHD than those who were negative particularly for the teacher's scale (27.55± 4.60 *vs*. 26.50± 3.76; P=0.03). There were no significant differences in the child weight at birth between positive and negative children for ADHD.

Table 5 shows increased risk of ADHD based on both scales by irritable parents' relation, irritable parent-child relationship, parents consanguinity, living with smokers, watching TV,

having cyanosis and head trauma. In addition, the risk of ADHD based on the parent's scale was increased by increased birth order (>4th). Also students who exposed to punishment were more likely to be ADHD positive based on the teacher's scale compared to those who did not. While students from urban areas and those with higher socioeconomic status had reduced risk of ADHD.

Discussion

ADHD is commonly detected at primary school children, which may give a chance for early diagnosis and early intervention. This study aimed at estimating the prevalence of ADHD among primary school children in Al Qalyubia Governorate and to investigate the relationship between ADHD and potential risk factors.

A teacher questionnaire was completed for 921 students. Of these, 437 (47.45%) had a completed parent questionnaire. The poor response rate regarding the parent's questionnaire might be attributed to illiteracy, negligence or lack of knowledge about ADHD among parents.

In this study, the prevalence of ADHD among primary school children was 21.8% based on the teacher rating scale and 16.2% based on the parent rating scale (Table 1). This was higher than the previous estimated prevalence of ADHD in primary school children in Egypt [5-8]. In 2005, the Children's Attention and Adjustment Survey (school and house forms) of elementary schools children in Assiut City reported a prevalence of ADHD of 6% based on the Wechsler Intelligence Scale, DSM-IV for ADHD, social scale assessment and clinical evaluation [6]. In Cairo, a total of 251 (7.9%) of school children had ADHD diagnosis using the DuPaul

ADHD rating scale (a teacher questionnaire) and a further evaluation using DSM-IV was done to confirm ADHD symptoms [7]. Also, in Minia city, Egypt, the prevalence of ADHD in pre-school and primary school children was 6.5% based on the modified Arabic version of the Connors, a Stanford Binnet test version 4, EEG and routine laboratory workup [8]. The prevalence of ADHD was 6.9% in primary school children in Menofia governorate based on parent's and teacher's scales and confirmed by psychological assessment [5]. Similarly, it was found that the prevalence of ADHD in Italian students aged 5-15 years was 3% using the screening rating scale for teachers followed by a specific clinical-diagnostic assessment [24]. Also, the prevalence of ADHD among elementary students aged 6-12 years in Tabriz (Iran) was 9.7% based on the Conner's teacher rating scale followed by an interview with children who had high scores [25]. However, in Brazilian Amazon, the prevalence of ADHD in children aged 7-16 years was 24.5% based on the parent rating scale designed from DSM IV criteria [26].

The estimated prevalence of ADHD in the published literature was related to the study methodology, diagnostic tools and demographic characteristics of the population, such as ethnicity, gender and age [26]. In addition, the prevalence depends on the person evaluating the symptoms, such as the parent, teacher or child [24].

The higher prevalence rate in this study may be due to the diagnosis of ADHD was based on highly sensitive screening tools for disorder which result in higher prevalence. The low prevalence in the other studies may be due to using different tools and more specific objective diagnostic measures.

In this study, the prevalence of ADHD based on the parent rating scale was lower than the teacher rating scale. This difference might be attributed to parents being more tolerant of disruptive behavior and unwilling to report problems to avoid stigmatization. Moreover, the teacher plays an important role in the assessment process, providing information on academic history and performance, social relations and general everyday functioning, thus playing a very important part in the screening for ADHD. Correspondingly, the prevalence rates of ADHD were 8% and 9.6% for parent and teacher evaluations respectively in a Swiss sample of school-aged children [27]. Also, a met-analysis of 86 studies concluded that the prevalence of ADHD based on parent ratings was lower than the teacher ratings (6.1% and 7.1% respectively) [3]. Similarly, in Palestine, it was 15% and 18% respectively [28].

However, in United Arab Emirates the prevalence of ADHD based on parent ratings was higher than the teacher ratings (4.1% and 3.4% respectively) [29]. Also, in Japan, it was 31.1% and 4.3% respectively [30]. This was explained by parents may expect their children to be well behaved, thus evaluating their behavior more strictly. Also, children tend to behave more freely at home than at school which might lead the observers to conclude children were more symptomatic of ADHD.

The present study showed that the most frequent clinical type of ADHD was the combined type followed by hyperactive impulsive type and inattention type (Table 1). This agrees with previous studies in Island of Mallorca [31], in Italy [24] and in Saudi Arabia [18] which found the combined

type was the most common type. However, the hyperactive/impulsive subtype was the most prevalent in Minia city, Egypt [8]. Also, it was found that the hyperactive/impulsive was the most common subtype in Trabzon, Turkey [32]. While in Jeddah, Saudi Arabia, the inattention subtype was frequently reported in primary school children [33]. Also, Willcutt (2012) concluded that the inattention type was the most common subtype in all samples [3].

The current study revealed that there was no significant difference between males and females ADHD cases (Tables 2). This finding agrees with the previous study on children aged 6-8 years in Alexandria governorate, Egypt [34]. However, it was reported that ADHD was significantly higher in boys than girls in Cairo, Egypt (79.3% *vs*. 20.7%) [7], in Qatar (16.7% *vs*. 5.4%) [19] and in Germany (97.7 *vs*. 1.8%) [35].

ADHD was more frequent in elder children (≥9 years) particularly following the teacher's rating scale (Table 2). This comes along with the results reported in Saudi Arabia on primary school children, where the highest prevalence was noticed in the age group 9-11 years followed by 6-9 years and those students who were 11-13 years old had the lowest prevalence rate [18]. Also, it was found that the prevalence of ADHD was highest in elementary school samples (11.4%) followed by preschool (10.5%) which then declined in samples of adolescents (8.0%) [3]. Along with this, it was reported that prevalence rates of ADHD increased from 1.5% during preschool ages (3–6 years) to 5.3% during primary school age (7–10 years) and further rise to 7.1% at 11–13 years of age then the prevalence rate declines to 5.6% in adolescents (14–17 years) in

Germany [35]. The increased prevalence of ADHD in elder children can be explained by increasing teacher expectation as the child becomes older the child expected to behave in certain manner and as the child grows co-morbid disorders start to appear which result in greater impairment.

This result disagreed with previous studies in Saudi Arabia, where the prevalence of ADHD was 1.4% at age 6-8 years, 1.2% at age 9-11 years and 1.1% at age 12-15 years in [36]. Similarly, the prevalence was 13.9% at age 6-9 years and 9.2% at age 10-12 years in Qatar [19].

In this study, the risk of ADHD was reduced in children with higher socioeconomic levels and from rural areas. These agree with previous studies [8;19;20;35], which considered poor socioeconomic condition is the main contributor for ADHD. Correspondingly, studies in Colombia [37], Australia [38], United States [39] Germany [40] and Iran [25], indicated that individuals from low socioeconomic environments were 1.5–4 times more likely to meet criteria for ADHD than individuals from families with high socioeconomic status.   However, there was no significant difference as regard social status between cases of ADHD and controls mentioned by [6;41-43]. Moreover ADHD was detected in families with high social status in which the child was spoiled [44].

In this study, the risk of ADHD was associated with increased birth order, child punishment, irritable parents' relation and poor parent-child relationship, watching TV, having head trauma and cyanosis, positive parent consanguinity and exposure to passive smoking during pregnancy (Table 5).

Regarding birth order, the increased risk of ADHD with increased birth order might be due to increased mother age and the risk of some medical problems especially chromosomal aberrations and decreased interest in rearing last child. Accordingly, it was found that the prevalence of the disorder was higher if the child was the sixth one in the family compared with the first-born child [18]. However, higher prevalence was reported in the first birth order children compared to controls, which was attributed to increased risk of complicated pregnancy in primigravida than multigravida, the lack of experience of mothers to deal with the first baby and the first child is at risk of over protection and spoiling [6;8]. Meanwhile, there was no significant difference between cases and controls who were the first and the last-born children in Cairo [7].

ADHD was more likely in children with poor parents' relation particularly those living with single parent. This corresponds to previous reports which found that ADHD cases were more likely in children who were living with single parent and more likely to had family conflicts [7;18;45;46]. This can be explained by the lack of sufficient support for optimal development of the child.

In this study, the risk of ADHD was associated with irritable parent-child relationship and physical punishment of children. In line with this, it was reported that ADHD cases had higher proportion regarding exposure to parental aggression (18.4% *vs.* 5.7%), abuse (18.4% *vs.* 2.3%) and cold family relations and criticism (24.1% *vs.* 5.4%) compared to controls [20]. In addition, children who suffered verbal abuse from their mother had prevalence 3.7 times higher than those

who did not over one year follow up of school children in Southeastern Brazil [47]. Similarly, ADHD cases were more likely to have emotional abuse than controls (31.25% *vs*. 5.81%) in China [46].

Regarding consanguinity, the risk of ADHD was seven times higher in children who had consanguineous parents than those who did not. Correspondingly, it was found that consanguineous parents were significantly more prevalent (P=0.003) among ADHD patients (13.8%) than controls (5.7%) in Eastern Cairo, Egypt [20]. However, there were no significant differences between cases and controls regarding consanguinity in Assiut city, Egypt [6] or in Qatar [19].

In the present study, the risk of ADHD was linked to exposure of mothers to passive smoking during pregnancy. Along with this finding, it was suggested that maternal smoking during pregnancy was considered one of the most common risk factors for ADHD [48]. However, there were no significant differences between cases (33.9%) and controls (26.5%) regarding maternal exposure to cigarette smoking during pregnancy [7].

The link between watching TV and ADHD was supported by the results reported on adolescents in Vermont [49] and on elementary school students in South Korea [50]. In contrast, there was no significant difference for the frequency or duration of video game play between ADHD children and controls [51].

In this study, children who suffered cyanosis or had head trauma were more likely to have ADHD. This was also reported in previous studies and was explained by the occurrence of minor damage in the central nervous system, which can lead to the appearance of ADHD in those children [6;20].

In this study, the mothers of ADHD positive children were more likely older, suffered toxemia of pregnancy, had Caesarean section (CS) and practiced artificial feeding than the mothers of negative children. However, logistic regression analysis did not yield significant associations between these factors and ADHD.

It was suggested that pregnancy problems including toxemia of pregnancy were potential risks for ADHD [52;53]. However, there was no significant difference between cases and controls with respect to antenatal hazards and advanced maternal age [7].

It was found that CS was more frequent in ADHD suspected children in Iceland [54]. This supported the link between ADHD and the mode of delivery (CS).

The association between artificial feeding and ADHD was supported by previous studies [6;8;18], where bottle-feeding was significantly higher among cases than controls. This could be attributed to the deprivation from warmth feeling and contact with mother during breast-feeding.

The main strengths of the present study were the investigation of a wide range of socio-demographic and environmental risk factors related to ADHD and the use of both parent's and teacher's scales for the identification of ADHD positive and negative students.

The main drawback of this study was the reluctance and lack of cooperation of parents in filling the questionnaires, in spite of sending explanatory letters with students.

This study revealed that ADHD is a real problem of public concern that calls for a program to overcome it. This program comprises two pillars:

First, a comprehensive health education program for primary prevention of ADHD through increasing knowledge of ADHD and its risk factors, clinical picture and burden, changing faulty behaviors (*e.g.* smoking, spending many hours in watching TV and video games) and motivating people to follow sound behavior (*e.g.* establishing positive parent/teacher-child relationship).

Second, integration of mental health including ADHD prevention and control within primary health care (family medicine) services particularly school health service with suitable guidelines for early detection and management.

Further large-scale follow up studies employing specific objective diagnostic tools for ADHD, are recommended to identify the behavior of this disorder and factors that aggravate or alleviate symptoms.

Finally, it can be concluded that ADHD presents a troublesome public health problem among primary school children in Al Qalyubia Governorate. The link between ADHD and a number of risk factors indicates collaborative efforts to control these risk factors and to decrease the prevalence of ADHD.

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Key messages

- ADHD is a common neurobehavioral disorder of childhood
- It can be detected at primary school which allows for early interventions to minimize social and educational disabilities related to this disorder.
- A range of environmental and neurobiological factors has been identified as predisposing factors for ADHD.
- A multi-displinary approach is indicated to control these factors and decrease the prevalence of ADHD.

Table 1 Prevalence of ADHD among the studied group

Variable		Parent's rating scale (No.=437)		Teacher's rating scale (No.=921)	
		No	**%**	**No**	**%**
Diagnosis of ADHD (No.=437)	Negative	366	83.8	720	78.2
	Positive	71	16.2	201	21.8
Subtypes of ADHD*	Hyperactive	20	28.2	52	25.9
	Inattention	15	21.1	43	21.4
	Combined	36	50.7	106	52.7

*For positive cases only

Table 2 Relationship between ADHD and socio-demographic characteristics of the studied children

Variable	Parent's rating scale						Teacher's rating scale					
	Positive (n=71)		Negative (n=366)		χ^2	P	Positive (n=88)		Negative (n=349)		χ^2	P
	No	%	No	%			No	%	No	%		
Sex												
Male	38	53.52	173	47.27	0.93	0.33	47	53.41	164	46.99	1.16	0.28
Female	33	46.48	193	52.73			41	46.59	185	53.01		
Age (years)												
< 9	27	38.03	183	50.00	3.41	0.06	30	34.09	180	51.58	8.61	0.003
9 ≥	44	61.97	183	50.00			58	65.91	169	48.42		
Residence												
Rural	48	67.61	247	67.49	0.00	0.98	52	59.09	243	69.63	3.56	0.6
Urban	23	32.39	119	32.51			36	40.91	106	30.37		
Socioeconomic status												
Low (scores <42)	37	52.11	79	21.58	FET	<0.001	37	42.05	79	22.64	13.63	0.001
Middle (scores 42 -63)	33	46.48	260	71.04			47	53.41	246	70.49		
High (scores 64 -84)	1	1.41	27	7.38			4	4.55	24	6.88		
Birth order												
1st	11	15.49	79	21.58	FET	0.007	19	21.59	71	20.34	FET	0.04
2nd-4th	52	73.24	277	75.68			61	69.32	268	76.79		
>4th	8	11.27	10	2.73			8	9.09	10	2.87		

Table 3 Variations in the prevalence of ADHD by psychosocial characteristics of the studied children

Variable	Parent's rating scale						Teacher's rating scale					
	Positive (n=71)		Negative (n=366)		χ^2	P	Positive (n=88)		Negative (n=349)		χ^2	P
	No	%	No	%			No	%	No	%		
Child live with												
Both parents	59	14.36	352	85.64	FET	<0.001	74	18.00	337	82.00	19.53	<0.001
One parent	12	46.15	14	53.85			14	53.85	12	46.15		
Punishment												
Hitting	8	61.54	5	38.46	FET	<0.001	10	76.92	3	23.08	FET	<0.001
Bad words/ Insulting	52	31.33	114	68.67			55	33.13	111	66.87		
No	11	4.26	247	95.74			23	8.91	235	91.09		
Parents' relation												
Good	58	13.84	361	86.16	FET	<0.001	75	17.90	344	82.10	FET	<0.001
Irritable	13	72.22	5	27.78			13	72.22	5	27.78		
Parent-Child relationship												
Good	39	9.77	360	90.23	141.27	<0.001	55	13.78	344	86.22	115.15	<0.001
Irritable	32	84.21	6	15.79			33	86.84	5	13.16		
Consanguinity												
Yes	42	42.00	58	58.00	63.20	<0.001	50	50.00	50	50.00	71.90	<0.001
No	29	8.61	308	91.39			38	11.28	299	88.72		
Living with smokers												
Yes	38	42.70	51	57.30	57.46	<0.001	45	50.56	44	49.44	64.33	<0.001
No	33	9.48	315	90.52			43	12.36	305	87.64		

Table 4 Variations in the prevalence of ADHD by pre-natal, natal and post-natal factors

Variable	Parent's rating scale						Teacher's rating scale					
	Positive (n=71)		Negative (n=366)		χ^2	P	Positive (n=88)		Negative (n=349)		χ^2	P
	No	%	No	%			No	%	No	%		
Toxemia of pregnancy												
Yes	10	71.43	4	28.57	32.36	<0.001	11	78.57	3	21.43	30.71	<0.001
No	61	14.42	362	85.58			77	18.20	346	81.80		
Mode of delivery												
NVD	40	12.54	279	87.46	11.94	0.001	53	16.61	266	83.39	9.12	0.003
CS	31	26.27	87	73.73			35	29.66	83	70.34		
Cyanosis												
Yes	3	75.00	1	25.00	FET	0.01	3	75.00	1	25.00	FET	0.03
No	68	15.70	365	84.30			85	19.63	348	80.37		
Lactation												
Breast feeding	44	12.43	310	87.57	19.96	<0.001	58	16.38	296	83.62	16.32	<0.001
Artificial*	27	32.53	56	67.47			30	36.14	53	63.86		
Head trauma												
Yes	32	41.03	46	58.97	42.84	<0.001	43	55.13	35	44.87	72.28	<0.001
No	39	10.86	320	89.14			45	12.53	314	87.47		
Watching TV												
No	28	39.44	292	79.78	49.37	<0.001	31	35.23	289	82.81	81.15	<0.001
Yes	43	60.56	74	20.22			57	64.77	60	17.19		
Number of hours watching TV (hours/day)**												
1-2	3	9.68	28	90.32	24.92	<0.001	3	9.68	28	90.32	33.86	<0.001
3-5	22	35.48	40	64.52			33	53.23	29	46.77		
≥6	18	75.00	6	25.00			21	87.50	3	12.50		

*Include mixed feeding (breast feeding and artificial feeding); **For those who reported "yes" for watching TV (No.=117)

Table 5 Odds ratio of being a case of ADHD conditioned on potential risk factors

Variable (No.=437)	Parent's rating scale		Teacher's rating scale	
	OR (95% CI)	P	OR (95% CI)	P
Residence Urban *vs.* rural	0.33 (0.11-0.97)	0.04	-	-
Socioeconomic status* Low Middle High	0.15 (0.06-0.38)	<0.001	0.42 (0.20-0.89)	0.02
Birth order 1st 2nd-4th >4th	1.00 1.43 (0.39-5.24) 13.50 (1.87-97.49)	 0.59 0.01	-	-
Punishment* No Bad words/ Insulting Hitting	-	-	2.25 (1.13-4.46)	0.02
Parent relation Irritable *vs.* good	33.66 (3.87-292.59)	0.001	11.07 (1.49-82.47)	0.02
Parent-Child relationship Irritable *vs.* good	102.48 (20.02-524.56)	<0.001	9.97 (2.19-45.29)	0.003
Consanguinity Yes *vs.* no	8.37 (3.12-22.44)	<0.001	6.95 (3.04-15.87)	<0.001
Living with smokers Yes *vs.* no	6.83 (2.59-18.01)	<0.001	5.32 (2.31-12.24)	<0.001
Watching TV Yes *vs.* no	4.50 (1.74-11.69)	0.002	8.45 (3.75-19.03)	<0.001
Cyanosis Yes *vs.* no	48.35 (3.43-680.53)	0.004	20.06 (1.75-229.3)	0.02
Head trauma Yes *vs.* no	14.44 (4.99-41.80)	<0.001	17.38 (7.07-42.71)	<0.001

*A score was used as continuous value to get a trend