
Prevalence of Attention Deficit Hyperactivity Disorder in Children

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Abstract: Objectives: The aim of the study was to determine the prevalence of attention deficit hyperactivity Disorder (ADHD) and associated risk factors among children were attended the general pediatric outpatient clinic of Menoufia University Hospital. Background: Attention deficit hyperactivity disorder is the most commonly seen developmental disorders, with significant impacts on the child's social, psychological, and scholastic functioning. Methods: The study was conducted on 600 children (5 - 12 years) were attended the general pediatric outpatient clinic of Menoufia University Hospital . All studied patients were subjected to adequate history taking, full clinical examination, a questionnaire regarding socioeconomic, family and maternal variables and a parent-completed, ADHD Rating Scale of attention deficit hyperactivity symptoms was used. Results: The study revealed that the prevalence of probable ADHD in our study was 19.7%. and was higher in males than in females with a ratio 2.7:1. The most common type of probable ADHD was the combined type and the least frequent type was the inattentive type. There were many factors that were sought to be associated with increase possibility of developing ADHD. Conclusion: The present study shows a high prevalence of probable ADHD in children. our study also revealed that probable ADHD was associated with many risk factors, prevalence was high in the male sex, living in urban areas, low socioeconomic families, large family size, living with a single parent, family history of ADHD, preterm children, low birth weight and bottle fed children.

Keywords: Attention Deficit Hyperactivity Disorder, Children, Prevalence, Risk Factors

1. Introduction

Attention deficit hyperactivity disorder (ADHD) is the most common neurobehavioral disorder of childhood and can profoundly affect the academic achievement, well-being and social interactions of children⁽¹⁾. Any type of mental illness can have a negative impact on cognitive development and learning, and involves a very high cost to both the individual and society⁽²⁾.

Attention deficit hyperactivity disorder becomes apparent in the preschool and early school years. The most predominant three subtypes are inattention, hyperactivity-impulsivity and combined inattentive/hyperactive impulsive subtype⁽³⁾.

The variable incidence of ADHD, which ranging from 2% to 16% is depending on the diagnostic criteria and assessment tools⁽⁴⁾. ADHD is diagnosed much more often in boys than in girls⁽⁵⁾.

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 neurological factors. Attention deficit hyperactivity disorder is attributed to genetic factors in about 80%. Various environmental factors are associated with ADHD, such as pregnancy and birth related risk factors which are classified into three groups including prenatal, perinatal, and postnatal risk factor⁽⁶⁾.

Attention deficit hyperactivity disorder is commonly associated with other psychiatric and neurological conditions⁽⁷⁾.

Diagnosis depends heavily on parent and teacher reports, no laboratory tests reliably predict ADHD⁽⁸⁾. Early diagnosis can provide early intervention and diminish the negative impact of the disorder⁽⁹⁾.

This study aimed to estimate the prevalence of ADHD and associated risk factors among children were attended the

general pediatric outpatient clinic of Menoufia University Hospital.

2. Materials and Methods

2.1. Materials

The study group was composed of children (both sexes) who attended the general pediatric outpatient clinic of Minoufia University Hospital, from both rural and urban regions, at Minoufia Governorate /Egypt, from the beginning of January 2013 till the end of July 2013. Total number of children was 600 (286 boys and 314 girls) of ages between 5 to 12 years. Study represents different socioeconomic status. We excluded any children with apparent neurological disease, Age below 5 years and above 12 years.

2.2. Methods

The purpose of this survey was explained to the principals and the parents ensuring them that the collected information will be used for a better understanding of the characteristics of the children and will be confidential. They're taking part in the study was voluntary.

The study was approved by the Ethical Committee of Faculty of Medicine, Menoufia University.

After taking oral consent from each parent, the children were evaluated using the following:

1- A questionnaire inquiring about risk factors for ADHD was designed in Arabic language and was filled by parents. It inquired about the following factors: socio-demographic characteristics of the child, family size, family history of ADHD, living with both parents or single parent; parents' education and occupation, birth order of our child; Pregnancy duration, Type of delivery, Birth weight, Type of feeding during infancy. The questionnaire also inquired about exposure to the child's medical history and child's school performance.

2- Complete physical examination (General and neurological examinations) was performed for all children.

3- Screening for ADHD was done using the ADHD rating scale : The scale was developed based on the criteria of the 4th edition of the diagnostic and statistical manual of mental disorders(DSM-IV, 1994). The scale included: (18) items that measure characteristics of ADHD subtypes. Specifically, nine of the items are related to: (1) the inattentive type, (2) the other nine items are related to the hyperactive/impulsive type, and (3) the individual who rated as having significant problems on more than 6 items in both dimensions is counted as having the combined hyperactive/impulsive and inattentive type . Homidi⁽¹⁰⁾reported good internal consistency for this scale ($r=91$) . This standard instrument has been used in similar studies for survey of the prevalence of ADHD symptoms in other countries such as Turkey and Ukraine⁽¹¹⁾.

2.3. Statistical Analysis

Results were collected and statistically analyzed using

SPSS version 16,using the mean, standard deviation and chi-square test. Significance was taken at p values < 0.05 .

3. Results

This study showed that the prevalence of probable ADHD among children sample was 19.7% The most common type of probable ADHD was the combined type (Table 1) and (Figure 1).The prevalence of ADHD was higher in male (72.9%), than female with ratio 2.7:1(Table 2) and (Figure 2).

On the basis of the social-demographic risk factors which were sought to be associated with ADHD . Probable ADHD were statistically significant higher in children from urban area, and in low socioeconomic status children. The study showed statistically insignificant difference according to both parent education (Table 3).

According to the family risk factors which were sought to be associated with the three subtypes of ADHD. We was found that the prevalence was statically significant high in children with large family size (>4 children), family history of ADHD and among single parents children. Also was found that no significant difference according to birth order (Table 4).

According to the maternal factors which were sought to be associated with the three subtypes of ADHD. We was found that the prevalence was statistically significant higher in children born prematurely, and in bottle fed children. Our study also found no statistically significant difference according to birth weight and type of delivery (Table 5).

4. Discussion

Not all DSM-IV criterions of ADHD was included in the current study. Therefore, it should be emphasized that the results of this study only refer to the probable ADHD and not to the ADHD disorder. The results should be considered as screening prevalence and many false positive results may be included.

In the current study, it was found that the prevalence of probable ADHD in a group of children were attended the general pediatric outpatient clinic of Menoufia University Hospital, aged (5-12 year) in our study was 19.7%.

This high prevalence was similar to a study was done in Lebanon among 1781 school children aged (5-11 years) found the prevalence of ADHD was 22.3%⁽¹²⁾. A study was done in USA, California found the prevalence of ADHD was 20.4% in school aged children⁽¹³⁾. Prevalence of ADHD Symptoms in Preschool-aged Iranian Children Of 1403 children aged 3-6 years, was according to their parent evaluation 25.8%, and according to their teacher evaluation 17 %⁽¹⁴⁾. In Egypt, a study of the prevalence of ADHD among children from Delta region was 20.4%⁽¹⁵⁾.

In contrast to our study, Amiri *et al.*⁽¹⁶⁾found the prevalence rate of clinical ADHD in the elementary students of Tabriz (Iran) was 9.7%. Froehlich *et al.*⁽¹⁷⁾found the prevalence of ADHD was 8.7% in a study on American children aged (8-15 year). Farid *et al.*⁽¹⁸⁾in a study done in

Cairo/Egypt found the prevalence of ADHD in primary school children was 7.9%.

The high prevalence rate in our study may be due to, This study depends only on parents' observations, and the diagnosis of ADHD was based on a screening tool for disorder which result in higher prevalence.

This study showed that, combined type (ADHD-C) was the commonest ADHD type, this was also observed in several other studies^{(19),(20),(21)}.

The prevalence of probable ADHD among children in this study showed that the distribution between male and female was 2.7:1. This was also observed in several other studies^{(16),(20)}. However, other studies lacked significant difference between the different types of ADHD and gender^{(23),(24)}.

In our study the prevalence of probable ADHD in urban area was higher than rural areas. This similar to a study was done in Delta, Egypt, found that the prevalence of ADHD in urban area was higher than the prevalence in rural areas, this may be explained by culture differences between two areas, and environmental factor which contributes to the appearance of symptoms⁽²⁵⁾.

This study showed a significant association between, low socioeconomic status of the family and all three types of probable ADHD, this similar to the result of several studies^{(3),(26),(27)}. This could be explained by the fact that the children belonging to a lower social class are at an increased risk of having various psychiatric problems, because factors such as complicated pregnancy, mal- nutrition and exposure to environmental toxins and a greater like the hood of CNS damage are commonly associated with poor socio- economic status⁽¹⁸⁾.

Our study showed no significant association between parents' education, and all three types of probable ADHD, similar result had been shown by Al-Hamed et al.⁽³⁾. Several other studies^{(5),(18)} showed high prevalence of ADHD in children of parents with low level of education. Possible explanations: a) Parents with low level of education had poor knowledge of how to deal with children having ADHD and frequently lack several important parenting skills, b) Parents with low level of education might be treating children having ADHD violently and aggressively which may reflect negatively on them and lead to increased symptoms of ADHD, c) On the other hand, high levels of parents' education, especially mothers' education, were found to reflect positively on better physical and psychological health of their children⁽¹⁹⁾.

In the present study, the larger the family size (>4 children) the higher the prevalence of all the three ADHD subtypes. This finding is similar to other studies which showed the association of probable ADHD with large family size^{(28),(29)}. The larger the family size, the lesser care the child receives and the greater the behavioral problems observed,

ADHD is one of those problems⁽³⁰⁾.

The prevalence of probable ADHD was found to be statistically significantly higher in children living with single parents, this result was similar to other studies^{(31),(32)}. El-Tallawy et al.⁽²⁹⁾ reported, the separation of the child from one or both parents early in life was associated with increase prevalence of ADHD in accordance with current study. Parental separation and divorce had been shown to have negative effects on the child behavior such as inconsistent parenting, more punishment, violence, and criticism⁽³²⁾.

The present study showed a significant association of probable ADHD with families had a history of ADHD. Family studies have identified a 2 to 8 fold increase in the risk for ADHD in parents and siblings of children with ADHD⁽³³⁾.

In our study, we found that no significant difference, according to birth order. This was in agreement with other studies^{(34),(35)}, this was in disagreement with Frey et al.⁽³⁶⁾, who reported more ADHD symptoms among first birth, deficiency in experiences of mothers in dealing with their first baby that may lead to disorders in activity and attention. The first birth child has a special position in some families, that may act as one of the risk factors for ADHD (e.g. over protection and spoiling)⁽²⁹⁾.

This study showed statistically significant association between children born premature and all ADHD symptoms. Similar studies^{(37),(38)} were found that preterm children have three and two fold risk for hyperactivity-inattention problems compared with term children respectively. Preterm and early term birth increases the risk of ADHD by the degree of immaturity⁽³⁷⁾.

Several perinatal complications have been associated with an increased risk for short and long-term neurologic sequel. Perinatal asphyxia may cause hypoxia-ischemic encephalopathy in the neonate with widespread brain injuries as a consequence, and periventricular hemorrhage is a well known risk factor for cerebral palsy in preterm infants. However, these perinatal risk factors have not been investigated much in relation to ADHD⁽³⁹⁾.

This study showed statistically insignificant higher proportions of probable ADHD among low birth weight children, this was in disagreement with Valdimarsdottir et al.⁽⁴⁰⁾ who reported statistically significant increased risk for ADHD associated with low birth weight. A hospital-based study of 122 ADHD cases and 119 controls among Thai children revealed that the number of ADHD cases who had a birth weight below 2,500 g was 3.6 times higher than the number of control cases who had a birth weight below 2,500 g⁽⁴¹⁾.

This study showed statistically significant higher ADHD symptoms in bottle fed children than in breastfed children. The previous results were in agreement with this result^{(42),(43)}.

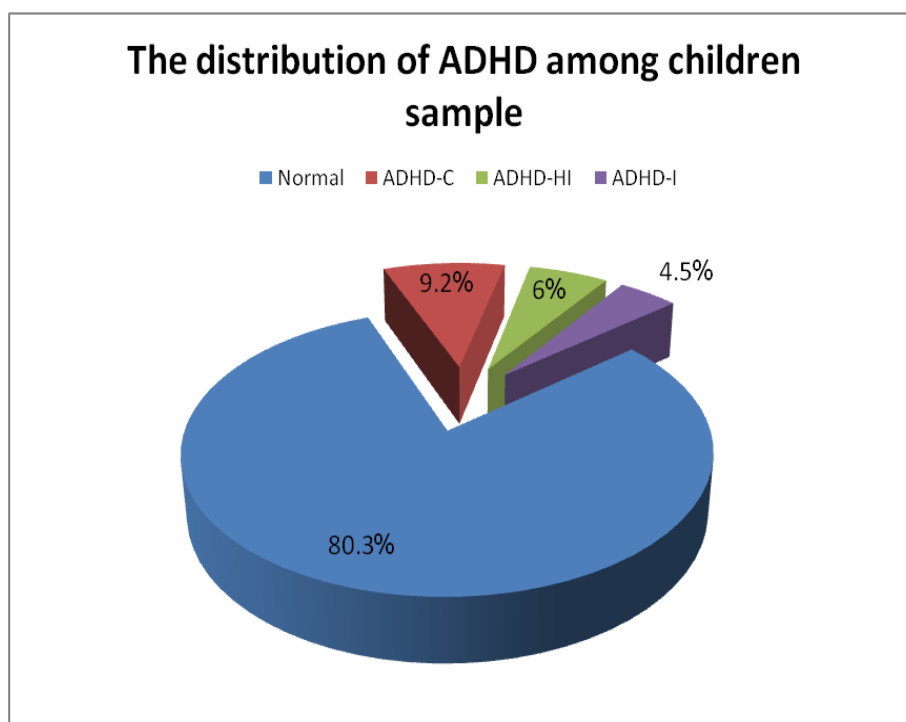


Figure (1). The distribution of ADHD symptoms among children sample.

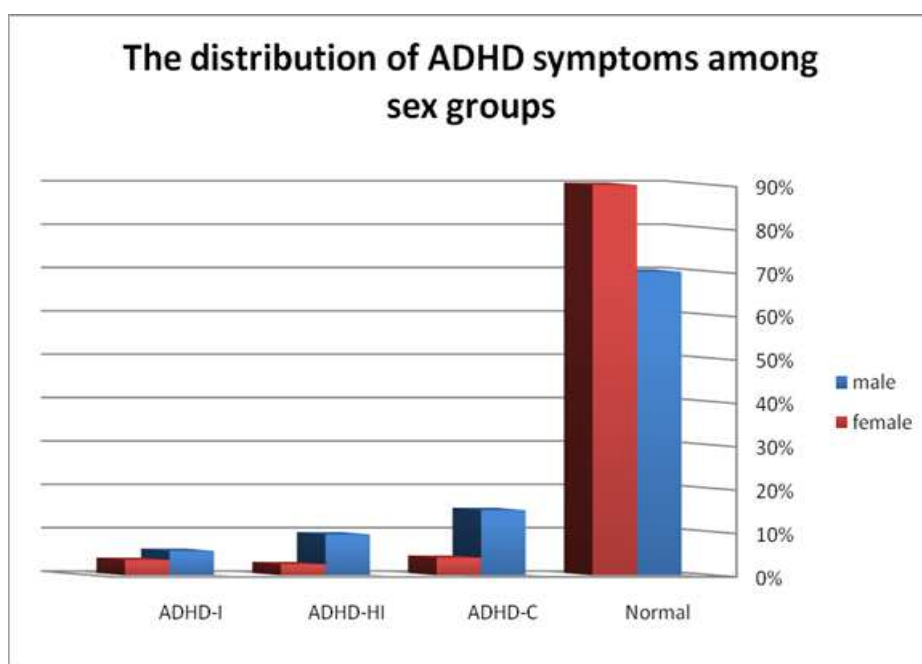


Figure (2). The distribution of ADHD symptoms among sex groups.

Table (1). The prevalence of ADHD symptoms among children sample.

Type of ADHD	Children with ADHD	
	NO.	%
ADHD-C	56	9.2 %
ADHD-HI	35	6 %
ADHD-I	27	4.5 %
TOTAL	118	19.7 %

Table (2). The prevalence of ADHD symptoms among children according to gender.

Gender	Children With ADHD (118)								Children Without ADHD	p-value(χ^2 -test)	
	ADHD-C		ADHD-HI		ADHD-I		Percent from cases(118)				
	NO.	%	NO.	%	NO.	%	NO.	%	NO.		%
Male (286)	43	15%	27	9.4%	16	5.6%	86	72.9%	200	70%	0.001*
Female (314)	13	4%	8	2.5%	11	3.5%	32	27.1%	282	90%	

χ^2 =Chi-Squared
Significant test $p < 0.05$

Table (3). Distribution of the studied children with ADHD symptoms according to socio-demographic risk factors.

Sociodemographic risk factors	Children with ADHD		Children without ADHD		p-value(χ^2 -test)
	No.	%	No.	%	
Residence: (600)					
Rural (285)	44	15.4%	241	84.6%	0.013*
Urban (315)	74	23.5%	241	76.5%	
Socio-economic status (600)					
Moderate and High(482)	84	17.4%	398	82.6%	0.005*
Low (118)	34	28.8%	84	71.1%	
Fathers' education(542)					
Low (read/write/prim/prep) (105)	21	20%	84	80%	0.78
Middle (Secondary school education) (315)	68	21.6%	247	78.4%	
High (university) (122)	29	23.8%	93	76.2%	
Mothers' education(600)					
Low (read/write/prim/prep) (145)	23	15.9%	122	84.1%	0.42
Middle (Secondary school education) (268)	56	20.9%	212	79.1%	
High (university) (187)	39	20.9%	148	79.1%	

χ^2 =Chi-Squared
Significant test $p < 0.05$

Table (4). Distribution of the studied children according to family risk factors.

Family factors	Children with ADHD		Children without ADHD		p-value(χ^2 -test)
	No.	%	No	%	
Family size: (600)					
<4 (509)	92	18%	417	82%	0.02*
>4 (91)	26	28.6%	65	71.4%	
Birth order :(600)					
1st (177)	39	22 %	138	78%	0.35
2nd & other (423)	79	19 %	344	81%	
Living with both parents or single parent:(600)					
Both (542)	100	18.5%	442	81.5%	0.02*
Single (58)	18	31%	40	69%	
Family history of ADHD:(488)					
No (453)	75	16.6%	378	83.4%	0.0001*
Yes (35)	21	60%	14	40%	

χ^2 =Chi-Squared
Significant test $p < 0.05$

Table (5). Distribution of the studied children according to maternal risk factors.

Maternal factors	Children With ADHD		Children Without ADHD		p-value(χ^2 -test)
	No.	%	No.	%	
Duration of pregnancy: (600)					
Full term (536)	94	17.5%	442	82.5%	0.0001*
Preterm (64)	24	37.5%	40	62.5%	
Type of delivery: (600)					
Normal vaginal delivery (508)	95	18.7%	413	81.3%	0.16
Caesarean section (92)	23	25%	69	75%	
Birth weight : (600)					
<2,500 kg (107)	21	19.6%	86	80.4%	0.99
> 2,500 kg (493)	97	19.7%	396	80.3%	
Type of feeding:(600)					
Breast feeding (390)	67	17.2%	323	82.8%	0.036*
Bottle feeding (210)	51	24.3%	159	75.7%	

χ^2 =Chi-Squared

Significant test $p < 0.05$

5. Conclusion

From the results of the present study it can be concluded that the prevalence of probable ADHD among children were attended the general pediatric outpatient clinic of Menoufia University Hospital was high. The study also revealed a variety of sociodemographic, family and maternal factors thought to be significantly associated with the development of ADHD. These included male sex, living in urban areas, low socioeconomic families, large family size, living with a single parent, family history of ADHD, children born premature, low birth weight, and bottle fed children.

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