

Attention-Deficit/Hyperactivity Disorder (ADHD) among Children Aged 6-10 Years in Damietta Governorate, Egypt

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ABSTRACT

Background:

Attention-deficit/hyperactivity disorder (ADHD) is a common public health issue in children. This condition, marked by inappropriate levels of inattention, impulsiveness, and hyper-activity, and frequently associated with impairment of daily home function, social relation, and academic achievement.

The study aim to identify the prevalence and risk factors associated with ADHD.

Methods:

A nested case-control study was conducted in Damietta governorate, Egypt in a period from April, 2018 to the end of October, 2018. A total of 947 children (aged 6-10 years) with their parents along were randomly included. All those diagnosed as ADHD (107 children) were selected as a case group and 214 non-ADHD children, selected as a control group (2 controls for every case randomly chosen from those have not ADHD).

Results: the study revealed the prevalence of ADHD was 11.3%. The results of the binary logistic regression test indicated that, child gender, birth weight, smoking exposure during pregnancy, mother's age at child birth and family type were independently associated with the occurrence of ADHD.

Conclusion: ADHD is prevalent public health problem and associated with important risk factors; child gender, birth weight, smoking exposure during pregnancy, mother's age at child birth and nuclear family type.

Keywords: Attention, deficit, hyperactivity, disorder, risk factors factors

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INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is educational and relationship disorders among children represent a major challenge to parents and teachers. It is the most prevalent neurobehavioral disorder in children. It is characterized by early onset of symptoms of inattention, hyperactivity, and impulsivity that begin in childhood (1). Complaints regarding symptoms of ADHD will start from teachers, caregivers or parents. It negatively affects the children's normal development and social and academic achievements (2).

ADHD classified into three clinical subtypes according to: inattentive (ADHD IA), hyperactive/impulsive (ADHD H/I), or the combined type (ADHD C) (3).

ADHD affects between 1% and 20% of children Worldwide in developed and developing countries. In Arab countries including Egypt vary considerably between 1.3 and 20 % (4-6). The variability in prevalence might be due to sample size, study type, diagnostic criteria, populations of the study, cultural and informants.

Attention deficit hyperactivity disorder is one of the leading causes of academic underachievement in school and occupational failure as well as disruptive behaviours. ADHD associated with an increased risk for accidents, criminality, social disability and addictions among children. It also has long-term individual, familial and social consequences and high economic burden (7).

All neuropsychiatric disorders are thought to be caused by a complex. Factors that contribute to the development of ADHD are still under researching. With it might be genetic and environmental and biological traits factors contributing to its onset (7, 8)

The factors contributed to the risk of ADHD were parents' education, mother's occupation, socioeconomic status, gender (male gender), birth order of the child, living with a single parent (9), Family smoking and drinking behavior, delivery type, and late starting of school (10) parental psychiatric disorders, previous abortion and unintended pregnancy (11, 12). Also intrauterine exposure to smoking (13), family history of ADHD (especially the mother during adulthood), or to poor socioeconomic status and high levels of familial stress (14), prenatal maternal stress, poor intrauterine environment, postpartum maternal depressive mood, short duration of breastfeeding, low birth weight, prematurity, and education of the mother (15, 16).

Early recognition, assessment and management of this condition can redirect the educational and psychosocial development of most children with ADHD (17).

Aim of this study was to identify the prevalence and to recognize the potential risk factors for the development of ADHD.

PATIENTS AND METHODS

Study design and subjects

A cross sectional study followed by a nested case-control study was conducted in a period from April, 2018 to the end of October, 2018 in Damietta governorate, which located in the Nile Delta region, Egypt. It is consists of 5 districts including rural and urban communities. By cluster sampling method, two villages and one city were selected from each district. Thus, the sample composed of 10 villages and 5 cities representing the 5 districts. A household survey was performed in these selected areas

by selecting one out of every four houses that had an eligible child aged 6-10 years. Sample from each district was proportionate to its size each, to represent the child in rural and urban areas. The sample size was determined using Epi info, version 7.1.5, 2015 (CDC) with a precision level of 5%, and 95% confidence level and 20.0% prevalence rate. A total of 947 children (aged 6-10 years) with their parents along were randomly included. All those diagnosed as ADHD (107 children) were selected as a case group and 214 non-ADHD children, selected as a control group (2 controls for every case randomly chosen from those have not ADHD).

ADHD diagnosed according to Diagnostic and Statistical Manual of Mental Disorders, form, the fourth edition (DSM IV).

Parents of the participant child were interviewed and informed consent was obtained from them. Predesigned questionnaire was used to collect the following data from the parents such as Gender of the child, gestational duration; birth weight, birth order of the child, breast feeding, mother's age at birth, parental's educational level, route of delivery; exposure to smoking during pregnancy, number of children in the family, family type, place of delivery (at home or hospital) and socioeconomic level.

Statistical analysis:

Data entered and analyzed using SPSS version 22. A chi-square test was used in bivariate analysis. $P < 0.05$ with 95 % confidence interval (CI) was considered statistically significant. Binary logistic regression was done to identify the factors that independently contributed to ADHD

Results:

The study surveyed 947 children aged 3-6 years old and detected 115 children with ADHD with prevalence rate of 11.3% (3:1 male to female ratio) (76.0% of ADHD were males) and for statistical analysis we randomly selected

214 children as control group.

The average age of mothers at birth of the child under the study was 22.3 ± 3.7 in ADHD group and 29.6 ± 4.8 in the control group (t value = 1.22, $P > 0.05$).

Table 1, shows that Being male carried a more risk for ADHD (OR = 3.8, $p = 0.001$) compared to being female. Low birth weight (< 2.5 kg) associated with elevated risk for ADHD (OR = 4.8 $p = 0.001$). Preterm baby at higher risk to develop ADHD (OR = 1.8, $p = 0.02$) compared to full-term baby. Also first birth order baby more likely than late birth order to develop ADHD (OR = 2.2, $p = 0.03$).

Table 1, also shows that mothers of children with ADHD had higher percentage of smoking exposure during pregnancy in comparison with those of control mothers of children (OR = 1.8, $p = 0.02$). Also mothers of children with ADHD were younger than mothers of control children (OR = 1.7, $p = 0.02$).

Children belonging to nuclear families were more likely than children belonging to extended families to experience ADHD (OR = 1.6, $p = 0.04$). Family with insufficient socioeconomic status associated with elevated risk for ADHD (OR = 1.7, $p = 0.03$) compared family with sufficient socioeconomic.

There was no a statistically significant differences between ADHD cases and control group as respect to parental education, route or place of delivery, gestational diabetes, bottle feeding and children's family size ($p > 0.05$) as reported in Table 1.

According to Table 2 The results of the binary logistic regression test indicated that, child gender, birth weight, smoking exposure during pregnancy, mother's age at child birth and family type were independently associated with the occurrence of ADHD (OR =4.8, CI = [2.6-8.9], OR =4.1, CI = [2.2-7.8], OR =3.8, CI = [1.7-24.18.2], OR =1.9, CI = [1.1-3.41], OR =2.5, CI = [1.1-5.9] respectively)

Table 1 Bivariate analysis of risk factors of ADHD

	Cases N=107(%)	Controls N=214 (%)	P value	Odd Ratio	95% CI
Gender: Male	81(76)	96 (45)	0.001	3.8	2.3-6.4
Low birth weight:	47(44)	30(14)	0.001	4.8	2.8-5.3
Preterm labor	62(58)	94(44)	0.02	1.8	1.1-2.8
1st. Birth order	36(34)	40(19)	0.003	2.2	1.3-7
Domiciliary delivery	34(32)	55(26)	0.3	1.3	0.8-2.2
Gestational diatetes	22(21)	33(15)	0.25	1.4	0.8-2.6
Bottle- feeding	17(16)	51(24)	0.1	0.6	0.3-1.1
Smoking exposure during the pregnancy	34(32)	43(20)	0.02	1.9	1.1-3.1
Mother's age	48(45)	68(32)	0.02	1.7	1.1-2.8
Insufficient income	47(44)	67(31)	0.03	1.7	1.1-2.8
Mother education level < Secondary	19(19)	26(12)	1.7	1.6	0.8-3.0
Father education level < Secondary	25(23)	30(14)	0.4	1.9	1.0-3.4
Vaginal delivery route	67(63)	117(55)	0.18	1.4	0.6-2.2
Nuclear family	67(63)	109(51)	0.04	1.6	1.0-2.6
Family size	38(33)	64(30)	0.31	1.3	0.8-2.1

Table 2 Multivariate logistic regression analysis of risk factors of ADHD

	P-value	Adj. OR	CI (95%)
Gender	0.001	4.8	2.6-8.9
Birth weight	0.001	4.1	2.2-7.8

Gestational duration	0.091	2.1	0.9-4.5
Place of delivery	0.416	1.9	0.4-8.6
Birth order	0.182	1.8	0.7-4.4
Bottle feeding	0.781	1.1	0.5-2.3
Smoking exposure during pregnancy	0.001	3.8	1.7-8.2
Mothers age at child birth	0.034	1.9	1.1-3.4
Gestational diabetes	0.84	0.8	0.16-4.5
Family size	0.621	1.5	0.3-6.3
Family type	0.039	2.5	1.1-5.9
Father education	0.553	1.9	0.2-17.3
Mother education	0.687	1.3	0.4-4.3
Delivery route	0.162	1.6	0.8-3.1
Socioeconomic status	0.756	1.1	0.5-2.5

DISCUSSION

There is no clear explanation of the precise cause of ADHD. Several hypotheses state that ADHD is a multifactorial condition (genetic, prenatal, perinatal, or environmental) (18)

In our study the prevalence ADHD was 11.3%. These results are less than that reported by Aboul-ata et al (5) and EL-Gendy et al (6) they reported a higher prevalence of ADHD (20.5%). Albatti et al (19) reported the prevalence rate of (ADHD) was 4.3% among children in Saudi Arabia.

Gender significantly associated with ADHD. This finding agreed with other studies (20, 21). This may be explained by the anatomical difference (slightly larger heads of males), the skeletal immaturity of boys relative to girls or due to referral bias as males.

Preterm birth child more likely at risk for ADHD Munoz-Silva et al (15) reported a similar result while Venkatesh et al (22) found no relation between prematurity and ADHD.

There was a highly significant association between birth weight and ADHD. This is in agreement with Hatch et al (23) finding. While Venkatesh et al (22) reported no association.

Birth order in this study carried 2.2 times a high risk of ADHD. This was in line with the study conducted in Saudi Arabia (24) and Egypt (5). It may be explained by poor mother to child attachment or overprotection and spoiling. Also it may be due to labor complications related to narrow pelvis in primigravida.

Maternal younger age at birth of child played as a significant risk for ADHD. This is in consistent with Huang et al study (25). While Schwenke et al (19) found no significant relation between ADHD and mother's age.

Maternal exposure to smoking during pregnancy significantly associated with ADHD. This is supported by previous studies (10, 25).

Children were living in nuclear families likely to develop ADHD more than those were living in extended family. These finding supported by (Venkatesh et al results (22). A child in a nuclear family can be affected by stress and conflict between parents, which can lead to increased behavioral issues in them.

In our study the number of children in the family was not significantly associated with ADHD. This inconsistency with other studies (5,25) that reported high frequency of ADHD in children belong to large family and explained this finding by less care to the child that lead to behavioral problems.

Our study revealed a significant association between

socioeconomic status and ADHD. This is in agreement with Rowland et al results (26). Children who belong to a lower socioeconomic status are at risk of developing different psychological disorders, including ADHD. This may be a result of complications related to pregnancy or delivery and malnutrition.

In our study, parental education was not statistically associated ($p > 0.05$) with ADHD. This supported by Schwenke et al (19) who reported no significant relation between ADHD and mother's educational level. While Istiklaili et al stated that, parental's education level significantly associated with ADHD (14). That is may be due to the impact of parental education on awareness, conscious and understand of children's behaviors and affect level a good care to children.

Also bottle feeding was not statistically associated ($p > 0.05$) with ADHD while Golmirzaei J et al (12) documented a significant association between formula feeding and ADHD and clarified by the emotional advantage of breast feeding and mother-child interactions (15).

Gestational diabetes not significantly associated with ADHD which similar to that reported by Chien et al (2).

Our results showed no relationship between AD and delivery route. Curran et al reported that was associated with increased risk of ADHD (27). While EL-Gendy et al reported increased risk of ADHD with vaginal route birth (6). This may be explained by psychological effects of delivery process and type and duration of exposure to anaesthesia.

Conclusion:

ADHD is prevalent public health problem and associated with important risk factors; child gender, birth weight, smoking exposure during pregnancy, mother's age at child birth and nuclear family type.

Limitation: This study was the recall bias which is the main disadvantage of case control study design.

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