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Research Article

### PREVALENCE OF ATTENTION DEFICIT AND HYPERACTIVITY DISORDER (ADHD) IN CHILDREN ATTENDING PAEDIATRIC ENDOCRINE CLINIC AT KING KHALID UNIVERSITY HOSPITAL, RIYADH, SAUDI ARABIA.

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#### Abstract:

**Background:** Attention-deficit/hyperactivity disorder (ADHD) is a chronic neurobehavioral disorder with a substantial lifelong impact on the health system in general. It is one of the most frequent childhood-onset psychiatric conditions, with an estimated worldwide-pooled prevalence exceeding 5% in school-age children, and a prevalence of 1.3-16% in Arab countries.

We hypothesized that pediatric endocrine clinics are one of the potential places of ADHD. Thus present study aims to investigate the prevalence of ADHD in children attending pediatric endocrine clinic, determine which gender group is affected more, and address the possible associated factors of ADHD.

**Method:** A quantitative, observational cross-sectional approach was used to estimate the prevalence of ADHD. The study population was children attending pediatric endocrine clinic at KKHU in Riyadh, Saudi Arabia, approached during their regular visit in the clinic from November 2015 to March 2016, and interviewed to fill a questionnaire includes social demographic questions, medical profile, and a valid screening tool for ADHD.

**Results:** Analysis revealed that the prevalence of ADHD in the study sample was 14.9% (46 cases out of 309 children). 67.39% of these cases were males (31 male case out of 309 children). Results provided evidence that ADHD was associated with low social economic status (SES), and other social demographic characteristics. There was no evidence to suggest any association between ADHD and obesity, thyroid dysfunction, and growth deficit.

**Conclusion:** ADHD occurs in males more than females. It has a high prevalence in children with different endocrine pathologies although there was no relation between (growth deficit, thyroid dysfunctions, and Obesity) and ADHD, except diabetes where diabetic child was found to be less likely to develop ADHD. Anyhow, further studies with bigger sample size will help understanding this link.

**Keywords:** Attention deficit; ADHD; Child; Endocrine; Hyperactivity; Neurobehavioral; Saudi Arabia.

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**INTRODUCTION:**

Attention-deficit/hyperactivity disorder (ADHD) is a chronic neurobehavioral disorder with a substantial lifelong impact on personal and social functioning, academic performance, and the health system in general [1]. It is one of the most frequent childhood-onset psychiatric conditions, with an estimated worldwide- pooled prevalence exceeding 5% in school-age children [2]. A Systematic review of the epidemiology of ADHD prevalence in Arab countries published in 2015 reported a prevalence ranging between 1.3-16% [3]. Only few population-based studies had been done that's why epidemiological information of ADHD in Saudi Arabia are insufficient [4].

A set of guidelines for the diagnosis of ADHD and its treatment in the primary health care setting was developed, according to these collaborative guidelines; the diagnosis of ADHD should be based on information obtained from parents, school, and health professionals [4]. Anyhow, there is also an Arabic clinically validated screening tool for evaluating children who might be suspected of having ADHD [5] and that what we used in our investigations.

Since the endocrine system has a major role in regulating mood, growth, tissue function, metabolism, sexual function and reproductive processes [6], many studies investigated the association between ADHD and different endocrine diseases. Net of research into this relationship result inconsistent findings about how would the child medical condition affect his/her susceptibility of getting ADHD, some studies suggest that children with endocrine dysfunction such as obesity [7], diabetes [8], growth deficit [9], and thyroid dysfunction [10] are more likely to develop ADHD and vice versa. Moreover, some literatures indicate that ADHD can be affected by several factors regardless the child medical condition, as child age and gender [11]. Although genetic and neurological determinants may be the primary predictors of difficulties with activity level and attention, etiology appears to be influenced by socioeconomic situation [12]. There are many concerns regarding family related factors like family income, parents age, educational level [12], and psychological profile [13]. We hypothesized that pediatric endocrine clinics are one of the potential places of ADHD, therefore further knowledge regarding its epidemiology will fill the gaps in the aspect of research since this was never been assessed in Saudi Arabia and poorly discussed world wide, and that will surely yield an important indications to optimize care providing and support

affected children, which can lead to a reduction in the poor outcomes these children often demonstrate later in life [14]. Thus present study aims to investigate the prevalence of ADHD in children attending pediatric endocrine clinic, and address the possible associated factors of ADHD to help finding undiscovered cases and provide them the proper attention and care they need.

**METHODOLOGY:**

A quantitative, observational cross-sectional approach was used to estimate the prevalence of ADHD. Our study population was children attending pediatric endocrine clinic at King Khalid University Hospital in Riyadh, Saudi Arabia, participants were approached during their regular visit in the clinic from November 2015 to March 2016.

The study questionnaire and consent form were developed in Arabic following a standard format targeting all children aged 5 up to 14 years, both males and females who are attending the endocrine clinic. Excluding those who are with a non-Arabic (companion/attendant) speakers and/or children with a (companion/attendant) who have auditory/visual impairment, as these conditions may interfere with the management or disrupt the administration of the questionnaire (Appendix A).

A pilot study was conducted using the questionnaire on 15 subjects (who were excluded from the actual sample) to estimate the time needed to fill the survey and test the logistics and its comprehensibility. The survey was adjusted accordingly.

The (companion\attendant) of those who meet the inclusion criteria, were interviewed to answer the questionnaire during working hours (8:00am-3:00pm) without further description or interpretation. But due to the lack of response, as many patients didn't attend the clinic for their follow up, data collection method was modified from interviewing at the clinic to phone calls interview to achieve the sample size in the proper time. The questionnaire was designed to obtain information about medical profile of the child. It also included social demographics questions about their kinship, age, gender, educational level, occupation, monthly income, habitation of the child, and medical and psychological conditions of parents and siblings.

They were also asked to fill a standardized scale for Attention Deficit and Hyperactivity Disorder Rating Scale ADHD RS (Screening tool for ADHD) (Appendix A). The scale contains 14 statements describing symptoms of ADHD, the respondent

should rank each statement from 0 to 3 by how often the child do them, when 0 refers to never, 1 rarely, 2 often, and 3 a lot. The cutoff point of ADHD is 23.5, but the scale can also be used to define which type of ADHD the child could have.

Based on the literature reviews and assuming prevalence of 15% with degree of precession  $\pm 4$  and 95% confidence interval, the sample size required is approximately 306 subjects. Data was analysed using SPSS software, version 22 using Chi square test and Fisher's exact test.

The study protocol was approved by the ethical review board of Collage of Medicine - King Saud University, Riyadh.

### RESULTS:

In total, we distributed around 500 surveys, 309 of them were completed and valid for analysis. Analysis revealed that the prevalence of ADHD in the study sample was 14.9% (46 cases out of 309 children). 67.39% of these cases were males,(31 male case out of 309 children), while 32.60% of them were female (15 female case out of 309 children). Table1 represents demographic characteristics of the respondents, 48.9%% of the study subjects were males while 51.1% were females. Majority of

children aged from 9 up to 14 (64.4%) and the rest were aged from 5 up to 9 (35.6%). 92.2% of the study subjects live with both of their parents. Furthermore, as Figure1 illustrates the difference in families income was significant with ADHD cases. The majority of the sample (47.9%) was in the third category (10000 up to 20000). However, children with ADHD lied mostly in the lower SES categories, representing 22.03% of families with income less than 5000 SAR, and 19.67% of children with the income range of 5000 up to 10000 SAR.

As shown in Table 2, 144 children with growth deficit, 25 of them are suspected to have ADHD (17.4%), While 17 out of 103 children who are diagnosed with thyroid dysfunction revealed positive ADHD (16.2%). ADHD children represented (17.1%) of children suffering from obesity according to the results). Overall, no significant association was found between ADHD and anyone of these diseases. In the other hand, there was only 1 diabetic child who seems to have ADHD out of 52 diabetic children, with a P - Value = 0.008 and an Odd Ratio= 0.0924, and a confidence interval (0.0124 to 0.6861). As Table 3 illustrates, parents of ADHD children reported higher levels of ADHD symptoms (66.66%), anxiety (31.57%), and depression (27.77%).

**Table 1.** Distribution of demographic characteristic of the study subjects.

<u>Variable</u>	Number of children (%)	<u>Variable</u>	Number of children (%)
<b><u>Gender</u></b>		<b><u>Father educational level</u></b>	
Male	151 (48.9%)	Never been to School	5 (1.6%)
Female	158 (51.1%)	Elementary School	30 (9.7%)
<b><u>Age Group</u></b>		Middle School	38 (12.3%)
5 up to 9	110 (35.6%)	High School	85 (27.5%)
9 up to 14	199 (64.4%)	College	120 (38.8%)
		Post Graduate	31 (10.0%)
<b><u>Child's Education Level</u></b>		<b><u>Mother educational level</u></b>	
Not in School	34 (11.0%)	Never been to School	9 (2.9%)
Kindergarten	12 (3.9%)	Elementary School	34 (11.0%)
Elementary	170 (55.0%)	Middle School	46 (14.9%)
Middle School	83 (26.9%)	High School	87 (28.2%)
Special	9 (2.9%)	College	114 (36.9%)
Other	1 (0.3%)	Post Graduate	19 (6.1%)
<b><u>Companion's kinship to the child</u></b>		<b><u>Father 's occupation</u></b>	
Mother	224 (72.5%)	unemployed/retired	58 (18.8%)
Father	65 (21.0%)	civil service	172 (55.7%)
Brother	5 (1.6%)	Military personnel	36 (11.7%)
Sister	10 (3.2%)	Private sector employees	39 (12.6%)
Other	5 (1.6%)	Other	4 (1.3%)

<b><u>Residence of the child</u></b>		<b><u>Mother's occupation</u></b>	
With both Parents	285 (92.2%)	housewife/retired	198 (64.1%)
With Mother Only	19 (6.1%)	civil service	94 (30.4%)
With Father Only	4 (1.3%)	Private sector employees	13 (4.2%)
Other	1 (0.3%)	Other	4 (1.3%)
<b><u>Family income</u></b>			
Less than 5,000 SR	59 (19.1%)		
5,000 up to 10,000	61 (19.7%)		
more than 10,000 up to 20,000	148 (47.9%)		
more than 20,000	41 (13.3%)		
<b><u>Age of the father</u></b>			
Less than 20			
20 up to 30	13 (4.2%)		
more than 30 up to 40	91 (29.4%)		
more than 40	205 (66.3%)		
<b><u>Age of the mother</u></b>			
Less than 20			
20 up to 30	42 (13.6%)		
more than 30 up to 40	150 (48.5%)		
more than 40	117 (37.9%)		

**Table 2.** Distribution and comparison of child medical and psychological conditions in relation to ADHD.

Variable	ADHD (yes\no) (%)
<b><u>Medical Conditions</u></b>	
Obesity	6\29 (17.1%)
Diabetes	1\51 (1.9%) *
Growth Deficit	25\119 (17.4%)
Thyroid Dysfunction	17\86 (16.2%)
Heart Diseases	4\8 (33.3%)
Neurological Diseases	6\22 (21.4%)
<b><u>Psychological Conditions</u></b>	
Intellectual disabilities	3\11 (21.4%)
Learning disabilities	9\13 (40.9%)
Autism	1\4 (20.0%)
Anxiety	3\13 (18.8%)
Depression	1\2 (33.3%)

\*  $P - value = 0.008$ , Odd ratio is 0.0924 with confidence interval of (0.0124 to 0.6861)

**Table 3.** Distribution of Parents medical & psychological conditions for children who are suspected to have ADHD.

Variable	Parents (yes)	ADHD cases n=46
<b><u>Medical Conditions</u></b>		
Diabetes	67	11
Obesity	27	7
Thyroid	61	10
Growth Deficits	11	2
<b><u>Psychological Conditions</u></b>		
ADHD	3	2
Anxiety	19	6
Depression	18	5
Bipolar disorder	1	0
Schizophrenia	0	0
Personality disorders	3	0

**DISCUSSION:**

In this study we attempted to assess the prevalence, associated factors, and the most likely affected group gender of Attention Deficit Hyperactivity Disorder (ADHD) among children attending pediatric endocrine clinic, especially children with obesity, diabetes, growth deficit, and thyroid dysfunction. According to general population based studies, ADHD prevalence in Arab countries is ranging between 1.3-16% [3]. Generally, there were 46 cases out of 309 children seem to have ADHD (14.88%), however, ADHD diagnoses should be done by the assessment of specialized psychiatrist with a valid diagnostic tool. According to a study conducted in Saudi Arabia published in 2003, the prevalence of ADHD in psychiatric clinics was 25.5% [15]. Which is much more higher than the prevalence we had at the endocrine clinic. Regarding the most affected gender group, males are more likely to get ADHD than females based on the present study results, and previous papers [16]. 64.28% of ADHD cases from the study subjects were males (45 out of 309), while 35.71% (25 out of 309) were females. Results of our study suggest that there is no association between obesity and ADHD as out of the 11.32% of children whom had obesity, 17.1% had ADHD (6 out of 35 obese children) with P - Value = 0.884 therefore obesity and ADHD are independent. This result was supported by some previous studies that had shown that children with ADHD have a prevalence of overweight similar to children in the general population [17] [18]. A recent study conducted in 2016 also indicates that ADHD overall association with obesity is not clinically significant in children [19]. There is lack of studies regarding the discussion about the relationship between ADHD and diabetes in pediatric population. According to our sample, we found only 1 diabetic child who seems to have

ADHD out of 52 diabetic children which represents only 1.9%, with a P - Value = 0.008 and an Odd Ratio= 0.0924, that's significant although the confidence interval is (0.0124 to 0.6861) which suggest that diabetic children are less likely to develop ADHD, but this association can be also affected by other factors which accompany diabetes as the caring attentive parents [12]. Growth and maturation in children with ADHD has been the subject of disputation for many years. Based on the literature review there were two different suggestions, first one was that ADHD may be associated with temporary deficits in growth in height through mid- adolescence that may be normalized by late adolescence [9], second was that the suppression of growth may be an intrinsic characteristic of ADHD have now largely been disproven [20]. Our study results were corroborated with the second suggestion since only 17.4% of the study subjects (25 out of 144 child with growth deficit) seemed to have ADHD with a P - Value = 0.326, concluding that ADHD and growth deficits are independent. A study published in The Journal of Pediatric reported that the prevalence of thyroid abnormalities is higher in children with ADHD (5.4%) compared to the normal population <1% [10]. Furthermore several studies of children with thyroid dysfunction suggest that there may be an association between thyroid hormone concentrations and measures of attention and hyperactivity [2]. However our study results conflicts that, whereas only 17 out of 103 (16.2%) child whom have thyroid dysfunction had ADHD.

In conclusion; ADHD occurs in males more than females. It has a higher prevalence in children with different endocrine pathologies than the general population although it seems that there is no relation between those diseases (growth deficit, thyroid



dysfunctions, and Obesity) and ADHD except diabetes, where the diabetic child in this study was found to be less likely to develop ADHD in comparison with other children attending the clinic. Anyhow further studies with bigger sample size will help understanding this link between diabetes and ADHD.

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