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Diagnostic Corelates of Depression Among Attention Deficit Hyperactivity Disorder (ADHD) Children

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Abstract

Background: Attention-deficit hyperactivity disorder is a syndrome of inattention, distractibility, restless, over activity, impulsiveness, and other deficits of executive function. Diagnosing major depressive disorder in children can be confronting.

Objectives: Estimation of sociodemographic characteristics and Depression among ADHD children

Methods: A cross-sectional study conducted on ADHD children attending 3 child psychiatry centers, Baghdad, Iraq. Data collected during the period March 1st, 2019 to September 1st, 2019. All ADHD children were included. Current unstable medical illnesses, not cooperative, not give their consent were excluded. Sociodemographic variables of were compiled using a questionnaire filled through a direct interview. Conners' Global Index - Parent Version used to confirm the diagnosis. Birleson Depression scale was used for diagnosis and assessment of depression.

Results: A total of 105 ADHD children, age range 6-11 years. First rank order (42.9%), not at school (64.8%), family referral (98.1%), and separated parent (6.7%), dead father (8.5%). About 60% of fathers were of low education. Employed father was 33.3%. More than half of mothers were of low education. ADHD with psychiatric comorbidity 37%. Depressed ADHD 12.4%. Significant correlation of depression was found with age group school level, states of living with parents, parents' marital status, and traumatic events.

Conclusion: There is a significant statistical correlation of depressed ADHD with; age, school level, status of living circumstances, parent marital status, traumatic event exposure. Suggesting that stressful social circumstances may be a key mechanism und

Keywords: Attention-deficit hyperactivity disorder; Depression; Psychiatric comorbidity; Traumatic event exposure; Neurodevelopmental type; Mental disorder; Psychiatric disorders; Depressive disorders; Medical practitioners; Mental health

Introduction

Attention deficit hyperactivity disorder

Attention-deficit hyperactivity disorder (ADHD) is a syndrome of inattention, distractibility, restless over activity, impulsiveness, and other deficits of executive function [1]. Attention deficit hyperactivity disorder (ADHD) is a mental disorder of the neurodevelopmental type [2]. It is characterized by difficulty paying attention, excessive activity, and behavior without regards to consequences which is not appropriate for a person's age. There are also often problems with regulation of emotions [3]. The symptoms appear before a person is twelve years old, are present for more than six months, and cause problems in at least two settings (such as school, home, or recreational activities). In children, problems paying attention may result in poor school performance. Additionally, there is an association with other mental disorders and substance misuse [4]. Diagnosing major depressive disorder (MDD) in children (5-12 years of age) can be confronting. Important debates continue regarding the validity of psychiatric diagnoses, especially in children and adolescents. Longitudinal research, however, has continually demonstrated that most adult disorders have their origins in childhood, and most childhood disorders have consequences that persist to adulthood [5]. There is evolving evidence to suggest MDD, as we currently understand it, can even exist in pre-schoolers. Over time, children with ADHD may become frustrated and demoralized because of their symptoms. They may develop feelings of a lack of control over what happens in their environment or become depressed as they experience repeated failures or negative interactions in school, at home, and in other settings. As these negative experiences accumulate, the child with ADHD may begin to feel discouraged.

Typically, in these situations ADHD symptoms appear first and the depression comes later. These negative reactions are common in individuals with ADHD and some expert claim that up to 70 percent of those with ADHD will be treated for depression at some point in their lives [6]. In addition to being saddened or demoralized because of ADHD, children may also experience a true depressive illness. To date, studies indicate that between 10-30 percent of children with ADHD may have a separate serious mood disorder like major depression [7-9].

Aims of Study

i. Estimation of sociodemographic characteristics of ADHD.

ii. Estimation of prevalence of Depression among ADHD children.

iii. Estimation of diagnostic correlate of depression among ADHD children.

Methods

Design and setting

This is a cross-sectional study conducted on ADHD children attending 3 child psychiatry centers in Baghdad, Iraq.

Data collected

During the period March 1st, 2019 to September 1st, 2019.

Inclusion criteria

All children with ADHD were included.

Exclusion criteria

Current serious or unstable medical illnesses that cannot complete the interview; not cooperative; and who did not give their consent to participate were excluded from the study.

Data collection Tools

Sociodemographic variables and clinical characteristics of ADHD children were compiled using a questionnaire filled through a direct interview. Conners' Global Index-Parent Version used to confirm the diagnosis of ADHD. Ten-Item Conners' *Global Index Parent Form-CGI-P* is composed of ten items used to evaluate the frequency and severity in the last week of the child's impulsivity, emotional outbursts and motor hyperactivity. Scoring is age and gender specific. The CGI-P has an internal reliability coefficient of 0.94. A test-retest reliability coefficient over a six to eight weeks interval was 0.8 for CGI-T. Scores over 65 are in the clinical range [10]. Birleson Depression scale used for diagnosis and assessment of depression. The Depression Scale for Children was developed in 1978 as part of a Master of Philosophy Thesis at the University of Edinburgh. The scale emerged from a longer inventory of 37 items that had been described in the literature as associated with major depressive syndromes in childhood. The test-retest reliability of the Scale on an independent sample showed satisfactory stability (0.80). Individual items had a reliability coefficient of 0.65-0.95. The Scale's corrected split-half reliability was 0.86 showing good internal consistency. The linearity of Scale items was assessed by factor analysis. A rotated matrix produced 5 factors that together shared 61% of the total variance. These factors were very similar to those found in adult studies. [11,12].

Definition of variables

The independent variables evaluated to explain depression were socio-demographics (age, gender, school level, marital status of parent, level of education of parent, occupation of parent, economic status, source of referral, living circumstances, smoking and alcohol of parent) and clinical characteristics (psychiatric comorbidity, family history of medical and psychiatric disorders, traumatic events exposure).

Statistical analysis

Statistical package of social sciences (SPSS) version 20 was used for data entry and analysis. Categorical variables were tested using chi square test. $P<0.05$ was considered statistically significant. *Ethical Issue*: Official approvals were granted from the officials in the study setting. Informed consent was obtained from each participant family to be included in this study. Names were kept anonymous and interviews were conducted with full privacy

Results

A cross sectional study includes a total of 105 ADHD children. Male 83.8%, female 16.2%. Age 7.33±1.57. More than two third of children were age 6-7 years (65.7%). First rank order (42.9%), live in their own house (71.4%), not at school (64.8%), normally delivered (61%), half of them within middle socioeconomic status (51.5%), separated parent (6.7%), dead father (8.5%). The education of the father was; 29.5% primary school, 26.7% institutes and colleges, 21.9% intermediate school, 15.2% secondary school, and 6.7% were illiterate. About one third of father occupation was employed 33.3%, 55.2% free work. More than half of mother was of low education; 28.6% primary school and 25.7% illiterate. Occupation of mothers; 85.7% housewife, employed 12.4%. About 71.4% were without family history of chronic medical illness and 70.6% without family history of chronic mental illness. Depressed ADHD children were (12.4%) [13]. About 50% of Depression found in age group below 10 years, mostly male (69.2%). living in illegal houses were 15.3% of depressed child. The level of school shows more depressed in those not at school 46% and the second class 23%. Most depressed children were the first rank order among siblings (55.8%), normal labor (69.2%). About 46.1% live with mother, 38.5% live with both parents, and 15.4% live with grandmothers. The economic status was low 46.1%, middle 38.5%, and high 15.4%. the parent marital status; married and live together were 46.1%, separated parent 38.5%, and dead father 15.4%. the education of parents of depressed ADHD children; father education were institutes and colleges 46.1%, primary school 30.8%, intermediate school 15.4%,

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and illiterate 7.7%. Mother education was colleges and institutes 38.5%, primary school 23.1%, illiterate 23.1%. The occupation of father was; free work 46.1%, and employed 23.1%. The occupation of mother 92.3% were housewife and 7.7% employed. Family history of medical illnesses was 30.8% and family history of psychiatric illnesses 38.5%. The psychiatric comorbidity was 30.8%. The exposure to traumatic events was 15.4%. There is a significant statistical correlation of depression with: age group (P<0.001), school level of the child (P=0.048), the status of living weather both parent, mother, or grand-mother (P<0.001), parent marital status (P<0.001), traumatic event (P=0.048) (Tables 1-4) (Figure 1).

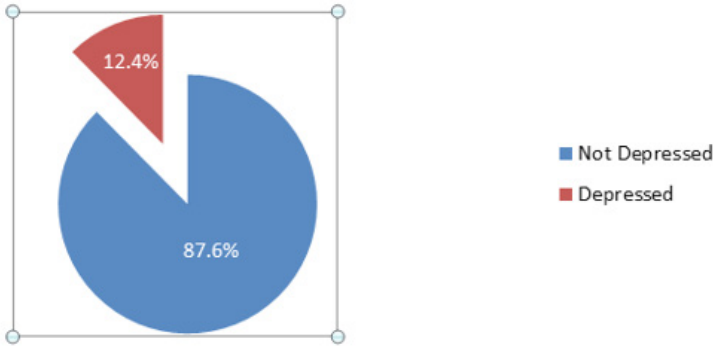

Figure 1: Depression among ADHD Children.

Table 1: The sociodemographic and clinical characteristic of the ADHD children involve in the study

The Sociodemographic and Clinical Characteristic of the ADHD Children involve in the Study No.		Total (105)	
		%	
Gender	Male	88	83.8
	Female	17	16.2
Age Group	6 - 7 Years	69	65.7
	8 - 9 Years	20	19.1
	10 - 11 Years	16	15.2
Rank Order	First	45	42.9
	Second	23	21.9
	Third	12	11.4
	Above Third	25	23.8
Housing state	own house	75	71.4
	Rented house	19	18.1
	Illegal house	11	10.5
School level	Not at school	68	64.8
	First Class	15	14.3
	Second Class	14	13.3
	Third Class	1	0.9
	Fourth Class	4	3.8
	Fifth Class	3	2.9
Source of Referral	Family Referral	103	98.1
	School Referral	2	1.9
Delivery	Normal	64	61
	Caesarian Section	41	39

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Economic Status	Low	35	33.3
	Middle	54	51.5
	High	16	15.2
Parent Status	Married	89	84.8
	Separated	7	6.7
	Dead Father	9	8.5
Education Father	Illiterate	7	6.7
	Primary	31	29.5
	Intermediate	23	21.9
	Secondary	16	15.2
	Institute and College	28	26.7
Occupation Father	Free	58	55.2
	Employed	35	33.3
	Military	3	2.9
	Retired	2	1.9
	Dead Father	7	6.7
Education Mother	Illiterate	27	25.7
	Primary	30	28.6
	Intermediate	18	17.1
	Secondary	12	11.5
	Institute and College	18	17.1
Occupation Mother	Employed	13	12.4
	Housewife	90	85.7
	Dead Mother	2	1.9
FHx Chronic Medical Illness	No	75	71.4
	Yes	30	28.6
FHx Psychiatric Illness	No	74	70.6
	Yes	31	29.4
Psychiatric Comorbidity	No	66	63
	Yes	39	37
Traumatic Event	No	100	95.2
	Yes	5	4.8
Total		105	100

Table 2: Mean and standard deviation, minimal and maximal values of age, Conners' scale, and Berilson depression scale.

	Age	Conners	Birleson
Mean	7.3333	22.781	12.8
Std. Deviation	1.57301	3.69506	5.35185
Minimum	6	16	6
Maximum	11	30	29

Table 3: Frequency and percentage of depression among ADHD children included in this study.

	No.	%
Not Depressed	92	87.6
Depressed Child	13	12.4
Total	105	100

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Table 4: The correlation of depression with sociodemographic and clinical characteristics of the ADHD children.

		ADHD				Total(105)		P value
	Not Depressed (92)		Depressed (13)					
	No.	%	No.	%	No.	%		
Age Group	6 - 7 Years	64	69.6	5	38.5	69	65.7	0.000
	8 - 9 Years	19	20.6	1	7.7	20	19.1	
	10 - 11 Years	9	9.8	7	53.8	16	15.2	
Gender	Male	79	85.9	9	69.2	88	83.8	0.127
	Female	13	14.1	4	30.8	17	16.2	
Housing state	own house	65	70.6	10	77	75	71.4	0.524
	Rented house	18	19.6	1	7.7	19	18.1	
	Illegal house	9	9.8	2	15.3	11	10.5	
School Level	Not at school	62	67.4	6	46.1	68	64.8	0.048
	First Class	14	15.2	1	7.7	15	14.3	
	Second Class	11	11.9	3	23.1	14	13.3	
	Third Class	1	1.1	0	0	1	0.9	
	Fourth Class	3	3.3	1	7.7	4	3.8	
	Fifth Class	1	1.1	2	15.4	3	2.9	
Source of Referral	Family Referral	90	97.8	13	100	103	98.1	0.591
	School Referral	2	2.2	0	0	2	1.9	
Rank Order	First	38	41.3	7	53.8	45	42.9	0.522
	Second	20	21.7	3	23.1	23	21.9	
	Third	10	10.9	2	15.4	12	11.4	
	Above Third	24	26.1	1	7.7	25	23.8	
Delivery	Normal	55	59.8	9	69.2	64	61	0.513
	Caesarian Section	37	40.2	4	30.8	41	39	
Live With	Both Parent	85	92.4	5	38.5	90	85.7	0.000
	Mother	3	3.3	6	46.1	9	8.6	
	Grand Mother	4	4.3	2	15.4	6	5.7	
Economic Status	Low	29	31.5	6	46.1	35	33.3	0.544
	Middle	49	53.3	5	38.5	54	51.5	
	High	14	15.2	2	15.4	16	15.2	
Parent Status	Married(Together)	83	90.2	6	46.1	89	84.8	0.000
	Separated	2	2.2	5	38.5	7	6.7	
	Dead Father	7	7.6	2	15.4	9	8.5	
Education Father	Illiterate	6	6.5	1	7.7	7	6.7	0.320
	Primary	27	29.4	4	30.8	31	29.5	
	Intermediate	21	22.8	2	15.4	23	21.9	
	Secondary	16	17.4	0	0	16	15.2	
	Institute and College	22	23.9	6	46.1	28	26.7	
Occupation Father	Free	52	56.5	6	46.1	58	55.2	0.184
	Employed	32	34.8	3	23.1	35	33.3	
	Military	2	2.2	1	7.7	3	2.9	
	Retired	1	1.1	1	7.7	2	1.9	
	Dead Father	5	5.4	2	15.4	7	6.7	

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Education Mother	Illiterate	24	26.1	3	23.1	27	25.7	0.279
	Primary	27	29.4	3	23.1	30	28.6	
	Intermediate	17	18.5	1	7.7	18	17.1	
	Secondary	11	11.9	1	7.7	12	11.5	
	Institute and College	13	14.1	5	38.5	18	17.1	
Occupation Mother	Employed	12	13	1	7.7	13	12.4	0.733
	House Wife	78	84.8	12	92.3	90	85.7	
	Dead Mother	2	2.2	0	0	2	1.9	
FHx Medical Illness	No	73	79.3	9	69.2	75	71.4	0.409
	Yes	19	20.7	4	30.8	30	28.6	
FHx Psychiatric Illness	No	75	81.5	8	61.5	74	70.6	0.097
	Yes	17	18.5	5	38.5	31	29.4	
Psychiatric Comorbidity	No	57	62	9	69.2	66	63	0.611
	Yes	35	38	4	30.8	39	37	
Traumatic Event	No	89	96.7	11	84.6	100	95.2	0.048
	Yes	3	3.3	2	15.4	5	4.8	

Discussion

The study showed Male 83.8%, female 16.2%, with more than 5:1 male: female ratio. More than four-fifth of the participants were boys aged 6 to 9 years. This finding agrees with most previous studies, underlining the risk of ADHD in this age group.13 The typical male preponderance was also noted in this study. The male to female ratio in this study was lower than Cuffe, Moore & McKeon study [14] and higher than the study by Adewuya & Famuyiwa [15] that reported 2:1 from their sample. However, according to Biederman et al. [16], the risk of ADHD is the same for boys and girls. The reports of male preponderance might be due to referral bias as males are more likely to present with more externalizing symptoms, such as hyperactivity and aggression, than females, which made it easier to be recognized and referred for treatment. The current study showed a comorbidity of depression about 12.4%. Depression may be a reaction to unpredictable environmental stressors such as being rejected by peers, getting made fun of by others, or thinking that school is a negative and overwhelming place. Depression may run in the family or may be more directly linked to biological or genetic causes; therefore, a separate diagnosis and specific treatment for symptoms for depression would be more appropriate.

The prevalence of depression among ADHD children of the current study is higher than many studies Ghandour et al. [17]: Among children aged 3-17 years, 3.2% had current depression. Charles J, Fazeli M [18]: Childhood MDD point prevalence is 1-2%, when compared with adolescent-onset MDD. The prevalence increases to 4-5%. These rates underestimate the number of children who do not meet DSM-5 diagnostic criteria for MDD, but who present to primary care with clinically significant depressive symptoms and functional impairment [18]. Mojtabai R [19]: The 12-month prevalence of MDEs increased from 8.7% in 2005 to 11.3% in 2014 in childhood [19]. Lima et al. [20]: Depressive disorders among children prevalence of 0.3% to 7.8% in children below 13 years old [20]. In Brazil, the prevalence of childhood depression among children below 14 years old varies from 0.2% to 7.5% according to the assessment method used [21-23]. Egger & Angold [24]: Depression is relatively uncommon in pre-pubertal children (1-2%) and rates differ little between boys and girls [24].

The result of this study is within the accepted range of many studies. Moffitt et al. [25]: prevalence of major depressive disorders range from 10%-17%. Furman L [26] estimates of the prevalence of depression among patients with ADHD range from 13% to 27%, while clinical sample reports have run as high as 60%.25 Conversely, among children and adolescents with depression, various studies have reported widely varying rates of ADHD (from less than 5% to more than 50%); a recent study in very young children reported a rate of 42% [26,27]. Spencer T [28]: A total of 10-40% of children with ADHD shows depression with symptomology of low or irritated mood, loss of interest and pleasure of usually enjoyable activities, sleep disturbances, and reduced appetite [27,28].

There is a significant statistical correlation of depression with: age group (P<0.001), school level of the child (P=0.048), the status of living weather both parent, mother, or grand-mother (P<0.001), parent marital status (P<0.001), traumatic event (P=0.048). The family variable of ADHD in this study that was found to be positively correlated with ADHD was having parents who were divorced or being a child of a single parent (P<0.001). Reduced family cohesion and chronic conflict may adversely affect marital or partner relationship resulting in the dissolution of the marriage. Divorce is permissible in the culture and religion of people in Iraq and it may explain this finding. This finding agreed with the report by Biederman et al. [29] from a similar

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study who found that reduced family cohesion, chronic conflict and parental psychopathology are associated with ADHD. This is further supported by findings from Fischer [30]. The reason for this might be because people in the study setting would not like to discuss issues about their marriage with strangers, even if they were medical practitioners, for cultural reasons [30].

Conclusion

ADHD, the most common diagnosis in child psychiatry, appears to be more challenging to diagnose when there is a comorbid depressive disorder. There is a significant statistical correlation of depression of ADHD children with; age, school level, status of living circumstances; weather parent, mother, or grand-mother, parent marital status, traumatic event exposure.

Recommendations

It is important to consider depression when interviewing children with ADHD. Prevention, early detection, and treatment of depression and other common mental disorders in childhood age groups are major goals of public mental health initiatives. Adaptation and broad implementation of effective treatment and prevention programs remains a challenge. The growing number of depressed children who do not receive any mental health treatment calls for renewed outreach efforts, especially in school mental health and counselling services and paediatric practices where many of the untreated depression may be detected and managed. More studies need to be done to verify the relationship of one disorder with another, if the individual who has depression can have ADHD, and verify the causality between depression and being ADHD.

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