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RESEARCH ARTICLE

Stress Level of Parents of Children Diagnosed with Attention-deficit/ Hyperactivity Disorder (ADHD) in Dubai, United Arab Emirates

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Abstract:

Background:

Attention-deficit/ hyperactivity disorder (ADHD) is a neurodevelopmental disorder that starts during childhood. It is commonly associated with elevated levels of parenting stress. This study aimed to examine parents' stress levels, potential contributing factors, as well as changes associated with the COVID-19 pandemic.

Methods:

This study was based on a cross-sectional design. The target population was parents of children with ADHD aged 6-18 years who were evaluated in a tertiary care hospital in Dubai, United Arab Emirates (UAE) from January 2018 to August 2021. Participants completed a survey, which gathered information on the child's personal characteristics and medical history as well as the parents' and family characteristics. Additionally, the parents stress level was evaluated using the English and Arabic-translated versions of the Perceived Stress Scale (PSS).

Results:

Parents of 103 children diagnosed with ADHD participated in this study. Most children were males (74.8%), and their mean age was 10.0 ± 3.4 years. Most children had ADHD as a primary diagnosis (87.4%), with ADHD subtypes being mainly combined presentation (60.2%), followed by a predominately inattentive presentation (35.9%). Psychiatric morbidity was present in 87.4% of the children, mainly learning disorders (41.7%), conduct disorder (34%), or autism spectrum disorder (24.3%). On the other hand, physical disorders were present in 68.9% of the children. Parents' perceived stress levels differed significantly according to their children's ADHD subtypes ($p=0.002$), with the highest stress levels among parents of children with predominately hyperactive/impulsive ADHD. PSS scores were moderate in 62.1% of the sample and high in 32% of the sample. Significant associations with elevated PSS scores was found in the presence of comorbid tic disorders ($p<0.001$) as well as in comorbid autism spectrum disorder ($p=0.029$). The most frequently reported items on the PSS were: being upset because of something that happened unexpectedly; feeling nervous and stressed; being angered because of things that were outside of your control; feeling unable to control important things in life; and feeling that difficulties were piling up so high that could not be overcome. Various changes were reported during the COVID-19 pandemic, which included a significant decrease in social activities (31.1%), time spent with friends (26.2%), conflicts between the child and siblings (18.5%), and conflicts between parents (25.3%). Furthermore, a significant increase was reported in children's average screen time (28.2%), the quality of the child's relationship with parents (19.4%), and the overall stresses faced by the family (16.5%).

Conclusion:

ADHD is commonly associated with high levels of parental stress. Factors associated with an increased level of stress include ADHD predominantly hyperactive/ impulsive subtype as well as comorbidity with tic disorders or autism spectrum disorder. Furthermore, the COVID-19 pandemic had a marked impact on children with ADHD and their families' social functioning.

Keywords: Stress, Parents, Children, Adolescents, ADHD, COVID-19 pandemic.

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1. INTRODUCTION

Attention-deficit/ hyperactivity disorder (ADHD) is a pervasive chronic condition that usually starts during childhood. It is characterized by inattention, impulsivity, and hyperactivity [1]. Patients with ADHD have adaptation difficulties within families, schools, and in relationships with their peers. The prevalence of ADHD in western countries ranges from 5% to 8% [2].

In the United Arab Emirates (UAE), Eapen *et al*. [3] reported a prevalence of 0.9%. However, in a study published one year later, Eapen *et al*. [4] reported a prevalence of 3%, suggesting an increasing trend of ADHD prevalence in the UAE. In the western regions of Saudi Arabia, Al-Zaben *et al*. [5] reported that the overall prevalence of ADHD in primary school students was 5%. Alhraiwil *et al*. [6] reported prevenances in various Arab countries; in Egypt, the prevalence of ADHD was 7.48% in children aged 3-5 years, while in Jordan it was 6.2% in children aged 6-12 years old, and it was 3.2% in Lebanese children aged 10 years.

ADHD is commonly associated with elevated levels of parenting stress. This is probably due to the parents' perceptions of the demands of their role as parents exceeding their resources to cope with them. Several studies noted that parental stress may increase both the symptoms of ADHD and the psychological maladjustment of children [7]. The increased parental stress may lead to negative parenting styles (*e.g*., inconsistent discipline, and corporal punishment), which reinforce the undesired behaviors of children [8]. Moreover, numerous studies have focused on the extent to which the behavior of children with ADHD impacts the parent's emotional state [9, 10] and have shown a reciprocal interaction between children's challenges and parental stress [11].

It has been shown that parents of children with ADHD experience higher levels of stress in comparison to those of control children [12]. Moreover, parents of children with ADHD reported greater parenting stress than parents of children with complex conditions, such as epilepsy [13] or autism spectrum disorder [14]. This relationship is not explained only by the ADHD symptoms themselves, but it is also due to the different problems comorbid with childhood ADHD, such as oppositional defiant disorder [15] and learning disabilities [16].

Parenting stress can be explained by both parents' and children's characteristics, in addition to situational variables. The influence of parents' characteristics on parenting stress has been widely documented. Several studies have found an association between mothers' and fathers' trait anxiety [17] maternal depression, and parents' ADHD symptoms [9].

In addition to the child's ADHD symptoms and parents' characteristics, the literature on parenting stress identified multiple related variables, for instance, the presence of externalizing and/or internalizing problems, the impact of symptoms on family life, and low levels of parental perceived social support [1].

The nature of ADHD symptoms may change as children grow into adolescence [18]. However, the relationship between children's age and parenting stress is generally inconsistent [10], and may differ between boys and girls [15].

The current pandemic of coronavirus disease 2019 (COVID-19) has triggered worldwide unexpected challenges, including severe financial losses, concerns regarding contracting COVID-19, and mandatory stay-at-home orders disrupting families' daily routines. These challenges have contributed to a heightened awareness regarding the potential for substantially increased family stress. Furthermore, given the persistent and repeated demands of this pandemic, many families are likely experiencing chronic stress, which is concerning given the physiological and emotional consequences of chronically elevated stress [19].

Previous infection outbreaks have resulted in profound psychosocial consequences [20] and emerging evidence during COVID-19 has shown similar patterns [21] particularly for parents, who experienced higher levels of stress during COVID-19, compared to adults without children, given the extra challenges of managing their children's at-home schooling, halting all extra-curricular activities, and navigating children's emotions around uncertainty and change [19].

Interventions during the COVID-19 pandemic, for instance, quarantine and its effects on routines, and lifestyle were associated with increased anxiety, stress, depression, unhealthy substance use, and self-harm or suicidal behavior [21].

Yousef *et al*. [22] argued that ADHD symptoms are an important reason for seeking psychiatric care as one of the most prominent neuro-developmental conditions. The stress associated with being a parent of a child with ADHD becomes even more difficult during the COVID-19 pandemic. Moreover, home isolation can results in an acute as well as prolonged psychosocial effect on children as a result of the significant changes in their lifestyle and physical activity [23].

Further research is needed to examine how parents' stress has changed over the course of the COVID-19 pandemic, and the specific stressors causing parenting difficulties. These data can be used to better understand the psychological impact of this pandemic on parents' mental health and how this pandemic is affecting parents of children with ADHD over time [19].

The aim of this study is to examine changes in parents' perceived stress, from before to throughout COVID-19, and to identify the predictors of parenting stress in a sample of families of children with ADHD. Understanding contributing factors will likely contribute to the development of required support strategies.

2. METHODS

2.1. Study Design

This study is based on a cross-sectional design using a survey completed by parents of children diagnosed with ADHD.

2.2. Participants and Procedures

Parents of children aged 6 to 18 years with a diagnosis of ADHD who were assessed at Al Jalila Children's Specialty Hospital, in Dubai, UAE, during the period from January 2018 and August 2021 were eligible to participate in this study. No parents were excluded based on age, gender, or ethnicity.

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Before starting data collection, the database of all patients who had an assessment at the Mental Health Centre of Excellence in Al Jalila Children's during the period from January 2018 to August 2021 was identified. A random selection was made for a sample of 537 records. Out of the identified records, 378 parents were excluded for being inaccessible or due to unconfirmed diagnoses of their children with ADHD. An electronic version of the study questionnaire was sent *via* Email and SMS to 159 parents who met the inclusion criteria.

2.3. Measurements

Several data were assessed in the study classified into demographic data, ADHD characteristics, treatment of ADHD, parents' stress level, and changes associated with the COVID-19 pandemic. For demographic data information was obtained on kinship, residence, parental age; marital status; education; occupation, and child's age; gender; number of siblings; birth order. For ADHD characteristics information was obtained on subtype, psychiatric comorbidity, and associated physical illness. For the treatment of ADHD information was obtained on the type of management: medications; behavioral interventions; or both, changes in condition: no change; deteriorating; improving, and attendance to follow-up visits. Parents' stress levels were assessed by the English and Arabic versions of the Perceived Stress Scale (PSS) [24]. The PSS is a widely used validated psychological instrument for measuring the perception of stress. It is a measure of the degree to which situations in one's life are appraised as stressful [24]. The PSS score is obtained by summing the points awarded to the 10 items and it ranges from 0 to 40 where 0-13 represents "Low stress", 14-26 represents "Moderate stress", and 27-40 represents "High stress" [24].

To assess the impact of the COVID-19 pandemic, information was obtained on changes in relation to social activities of the child, average screen time, physical activities, time spent with friends, quality of time with family, frequency of conflicts between children, frequency of conflicts between parents, sleep duration, academic performance, quality of family relationships, requirement for mental health consultations, parent's working hours, family income and overall stress experienced by the family.

2.4. Sample Size Calculation

Narkunam *et al*. [25] reported that the prevalence of stress among parents of children diagnosed with ADHD was about 70%. Assuming that the same prevalence prevails in the UAE, and in order to estimate this with the precision of 10% with 95% confidence interval, we need to study about 80 parents.

2.5. Statistical Analysis

Collected data were analyzed using the Statistical Package for Social Sciences (IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.). Descriptive statistics were applied accordingly, *i.e*., frequency and percentage for categorical data¸ in addition to mean and standard deviation for quantitative data. Testing the significance of differences was performed using the Chi-square ($\chi 2$) test, or the ANOVA test, accordingly.

2.6. Ethical Approval and Informed Consent

All the necessary official permissions have been fulfilled before data collection. We have obtained the Dubai Scientific Research Ethics Committee Approval Letter on 31 January 2022, Ref: DSREC-01/2022_19. Participation depended on reading and signing an electronic consent form. Participating parents were informed that their enrolment in the study is completely optional. The decision of any parent not to participate was fully respected and did not affect their child's provided care. Parents were encouraged to communicate with the main psychiatrist taking care of their children if they were perceiving high levels of stress.

All collected data were de-identified and protected through restricted user access *via* login through a secure hospital VPN only. Furthermore, to anonymize the data, the names of participants were replaced by codes and spreadsheets containing this information were kept only on an electronic copy, which was password-protected. This transformed anonymized data was only shared with co-investigators during the statistical analysis.

The safety of data and patient-related information was overseen by the principal investigator, who also consults with and reports to the Research Committee at Al Jalila Children's in case any concerns have arisen during the data collection phase.

3. RESULTS

An electronic version of the study questionnaire was sent *via* Email and SMS to 159 parents who met the inclusion criteria. Out of these parents, 103 gave consent and completed the survey (*i.e*., a response rate of 64.8%). In terms of sociodemographic characteristics, most children were males (74.8%), and their mean age was 10.0 ± 3.4 years. Mothers (81.6%) constituted the main kinship among the participants. Most participants lived in Dubai (80.6%). The mean number of children's siblings was 2.5 ± 1.7, while most children's birth order was either first or second (41.7% or 28.2%, respectively) (Table **1**).

Most children had ADHD as a primary diagnosis (87.4%), with ADHD subtypes being mainly combined presentation (60.2%), followed by a predominately inattentive presentation (35.9%). Psychiatric comorbidity was present in most children (87.4%), most common learning disorders (41.7%), conduct disorder (34%), or autism spectrum disorder (24.3%). On the other hand, physical disorders were present in 68.9% of the children (Table **2**).

In terms of treatment modality, 36.9% of the children were managed by medication along with behavioral interventions, 32% received medication only, and 22.3% received behavioral interventions only. The condition of 66% of children with ADHD improved, while the condition of 29.1% did not change and 4.9% deteriorated. Regular attendance of follow-up visits were reported by 74.8% of the study sample (Table **3**).

Table 1. Sociodemographic characteristics of children (n=103).

Characteristics	No.	%
Gender‡		
• Male	77	74.8
• Female	22	21.4
Child's age (Mean ± SD)	10.0 ± 3.4 years	
Kinship		
• Mother	84	81.6
• Father	16	15.5
• Other	3	2.9
Residence		
• Dubai	83	80.6
• Ajman	6	5.8
• Sharjah	9	8.7
• Ras Al Khaimah	4	3.9
• Abu Dhabi	1	1.0
Child's Number of Siblings‡		
• 0	10	9.7
• 1	23	22.3
• 2	20	19.4
• 3	21	20.4
• 4	19	18.4
• 5	6	5.8
No. of Siblings (Mean ± SD)	2.5 ± 1.7	
Child's Birth Order		
• 1st	43	41.7
• 2nd	29	28.2
• 3rd	11	10.7
• 4th	9	8.7
• 5th	7	6.8
• 6th or more	4	3.9

Note: ‡ Data of 4 cases are missing

Table 2. Distribution of diagnoses among children.

Diagnosis	No.	%
Primary diagnosis: ADHD	90	87.4
ADHD Subtypes		
• Predominately inattentive presentation	37	35.9
• Combined presentation	62	60.2
• Predominately hyperactive/ impulsive presentation	4	3.9
Presence of Psychiatric Comorbidity		
• Oppositional defiant disorder	5	4.9
• Conduct disorder	35	34.0
• Tic disorder	8	7.8
• Autism spectrum disorder	25	24.3
• Learning disorder	43	41.7
• Anxiety disorder	19	18.4
• Disruptive mood dysregulation disorder	8	7.8
• Psychotic disorder	3	2.9
• Depressive disorders	1	1.0
• Others	9	8.7
Presence of Associated Physical illness	32	31.1

Table 3. Management of ADHD among children.

Management of ADHD	No.	%
Management		
• No intervention	9	8.7
• Medication only	33	32.0
• Behavioural interventions only	23	22.3
• Medication and behavioural interventions	38	36.9
ADHD Condition Status		
• Did not change	30	29.1
• Deteriorated	5	4.9
• Improved	68	66.0
Attending Regular Follow-ups		
• Yes	77	74.8
• No	26	25.2

Table 4. Parents' sociodemographic characteristics.

Characteristics	No.	%
Father's Educational Level		
• Secondary	43	41.7
• University	41	39.8
• Postgraduate	19	18.4
Mother's Educational Level		
• Secondary	38	36.9
• University	52	50.5
• Postgraduate	13	12.6
Father's Occupation		
• Governmental employee	24	23.5
• Security/police/military	22	21.6
• Financial/business	10	9.8
• Engineering	7	6.9
• Healthcare	6	5.9
• Aviation	4	3.9
• Retired/unemployed	12	11.8
• Others	14	13.7
• Missing data	3	2.9
Mother's Occupation		
• Housewife/unemployed	48	46.6
• Healthcare	9	8.7
• Security/police/military	1	1.0
• Aviation	1	1.0
• Financial business	11	10.7
• Government employee	18	17.5
• Engineering	2	1.9
• Unemployed	3	2.9
• Deceased	1	1.0
• Missing data	9	8.7
Father's age (Mean ± SD)	44.5 ± 7.4 years	
Mother's age (Mean ± SD)	40.7 ± 6.2 years	

Parents' age (mean ± SD) was 44.5 ± 7.4 years for fathers and 40.7 ± 6.2 years for mothers. Parents' educational levels were most commonly secondary (41.7%, 36.9%) or university (39.8%, 50.5%) for fathers and mothers, respectively. The occupation of most fathers (23.5%) was in the governmental sector, while most mothers (46.6%) were housewives (Table **4**).

About two-thirds of parents of children with ADHD

reported a moderate level of stress (62.1%) and about one-third (32%) reported a high level of stress, (Fig. **1**). Parents' perceived stress levels did not differ significantly according to their educational levels, (Table **5**). However, parents' perceived stress levels differed significantly according to their children's ADHD subtypes (p = 0.002), with the highest stress levels among parents of children with predominately hyperactive/impulsive subtype, (Table **6**). Parents' stress levels did not differ significantly according to children's number of siblings (Table **6**).

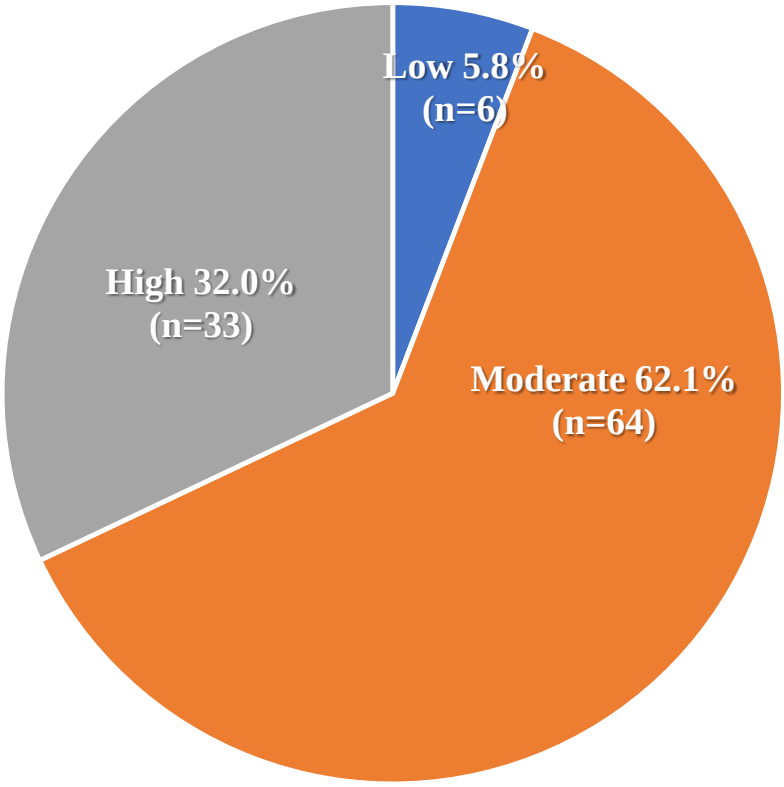

Fig. (1). Level of perceived stress among parents of children with ADHD.

Table 5. Parents' perceived stress levels according to their educational levels.

Educational Levels	Low (n = 6)		Moderate (n = 64)		High (n = 33)		P-Value
	No.	%	No.	%	No.	%	-
Father's Education	-	-	-	-	-	-	-
• Secondary	4	9.3	28	65.1	11	25.6	-
• University	1	2.4	25	61.0	15	36.6	0.592
• Postgraduate	1	5.3	11	57.9	7	36.8	-
Mother's Education	-	-	-	-	-	-	-
• Secondary	4	10.5	22	57.9	12	31.6	-
• University	2	3.8	33	63.5	17	32.7	0.593
• Postgraduate	0	0.0	9	69.2	4	30.8	-

Table 6. Parents' perceived stress levels according to their children's characteristics.

Characteristics	Low (n = 6)		Moderate (n = 64)		High (n = 33)		P-Value
-	No.	%	No.	%	No.	%	-
ADHD Subtypes	-	-	-	-	-	-	-
• Predominately inattentive	1	2.7	24	64.9	12	32.4	-

(Table 6) contd.....

Characteristics	Low (n = 6)		Moderate (n = 64)		High (n = 33)		P-Value
-	No.	%	No.	%	No.	%	-
• Combined	3	4.8	40	64.5	19	30.6	0.002†
• Predominately hyperactive/impulsive	2	50.0	0	0.0	2	50.0	-
No. of siblings (Mean ± SD)	3.17 ± 1.94		2.39 ± 1.72		2.73 ± 1.77		0.447

Note: † Statistically significant.

In terms of comorbidity, parents' perceived stress levels differed significantly when children had tic disorders ($p<0.001$), or autism spectrum disorder ($p=0.029$), (Table **7**). However, parents' perceived stress levels did not differ significantly in the presence of associated physical illness, (Table **8**).

The most frequently reported items on the PSS were being upset because of something that happened unexpectedly, feeling nervous and stressed, being angered because of things that were outside of your control, feeling unable to control important things in life and feeling that difficulties were piling up so high that could not be overcome, (Table **9**).

Several changes were reported during the COVID-19 pandemic, which included a significant decrease in social activities (31.1%), time spent with friends (26.2%), conflicts between the child and siblings (18.5%), and conflicts between parents (25.3%). Furthermore, a significant increase was reported in children's average screen time (28.2%), the quality of the child's relation with parents (19.4%), and the overall stresses faced by the family (16.5%) (Table **10**).

4. DISCUSSION

More than 90% of our study sample reported stress levels ranging from moderate to high intensity. Increased parental stress frequently leads to negative parenting styles, such as inconsistent discipline, and corporal punishment [1, 8]. This subsequently does not resolve the child's undesired behaviors. Children's challenges, specifically conduct problems, are a strong predictor of parental stress [1]. Challenging behaviors of children with ADHD contribute to increasing levels of parental stress [10]. Studies have highlighted a reciprocal relationship between children and their parents' attitudes and emotions [11].

It has been reported that quarantine during pandemics is a stressful experience for parents, as they are expected to balance their personal lives, work, and raise their children [26]. These periods probably put parents at a higher risk of experiencing distress, potentially impairing their ability to offer the required support and care to their children. Moreover, the experienced lack of support for children during lockdowns may lead to marked psychological symptoms [26].

In terms of exploring the disorder's characteristic, findings revealed that almost two-thirds of parents in our study sample had children with ADHD combined subtype, and about one-third had children with ADHD predominately inattentive subtype. The ADHD predominately hyperactive/ impulsive subtype was less common in this sample. Psychiatric comorbidities were commonly reported, mainly learning disorders, conduct disorder, and autism spectrum disorder.

Similar ratios of the subtypes of ADHD were reported by İpçi *et al*. For instance, the combined subtype represented 52.5%, the predominantly inattentive subtype represented 45.4%, and the predominantly hyperactive/ impulsive subtype was quite rare representing 2.1% of the sample [27]. Similarly, in a study sample by Mattingly *et al*., the percentage of childhood ADHD subtypes compromised of 74% having a combined presentation, 24% having a predominantly inattentive presentation, and only 2% having predominantly hyperactive/ impulsive presentation [28].

Felt *et al*. highlighted the importance of identifying and treating conditions that may co-occur with ADHD, for instance, anxiety, learning, mood, and sleep disorders [29]. In Dubai, United Arab Emirates, Jogia *et al*. found that more than three-quarters of children and adolescents with ADHD had at least one comorbid disorder [30]. The most common comorbidity among children was autism spectrum disorder, while among adolescents the most common comorbidity was anxiety disorders [30]. İpçi *et al*. reported that more than half of children with ADHD have associated comorbidities, mainly oppositional defiant disorder, major depression, obsessive-compulsive disorder, and anxiety disorder [27]. İpçi *et al*. added that if individuals with ADHD are left untreated, this will further result in academic, and social problems [27]. Comorbid psychiatric disorders likely aggravate the severity of the condition and markedly increase the stress levels of the parents of these children.

The findings of the present study showed that perceived stress was moderate among almost two-thirds of parents of children with ADHD, while it was high among almost one-third of the participating parents. The most frequently reported emotions were feeling upset because of something that happened unexpectedly; being nervous and stressed; being angered because of things that were outside of control; feeling unable to control important things in life; and feeling that difficulties were piling up so high that could not be overcome.

In line with the above results, Wiener *et al*. reported that parents of adolescents with ADHD had higher levels of stress than those of adolescents without ADHD [12]. Leitch *et al*. attributed the high stress among parents of ADHD children to their children's behavior, unmet needs for support, and social stigma [31]. Haack *et al*. indicated that parental stress can increase both the symptoms of ADHD and the psychological maladjustment of children [7].

Our study indicated that significant changes had occurred during the COVID-19 pandemic lockdown, including an increased child's average screen time, disturbed relations between family members, overall increased stresses experienced by the family and an increased need for mental health consultations for the child.

Table 7. Parents' perceived stress levels according to their children's psychiatric comorbidities.

Psychiatric Comorbidity	Low (n = 6)		Moderate (n = 64)		High (n = 33)		P-Value
	No.	%	No.	%	No.	%	-
Oppositional defiant disorder	1	20.0	2	40.0	2	40.0	0.312
Conduct disorder	3	8.6	19	54.3	13	37.1	0.440
Tic disorders	3	37.5	4	50.0	1	12.5	<0.001†
Autism spectrum disorder	0	0.0	12	48.0	13	52.0	0.029†
Learning disorder	3	7.0	27	62.8	13	30.2	0.883
Anxiety disorders	1	5.3	11	57.9	7	36.8	0.883
Disruptive mood dysregulation disorder	1	12.5	5	62.5	2	25.0	0.671
Psychotic disorder	0	0.0	2	66.7	1	33.3	0.909
Depressive disorders	0	0.0	1	100.0	0	0.0	0.735
Others	1	11.1	7	77.8	1	11.1	0.331

Note:† Statistically significant

Table 8. Parents' perceived stress levels according to the presence of physical illness among their children.

Associated Physical Illness	Low (n = 6)		Moderate (n = 64)		High (n = 33)		P-Value
	No.	%	No.	%	No.	%	-
Absent	6	6.7	54	60.0	30	33.3	-
Present	0	0.0	10	76.9	3	23.1	0.414

Table 9. Distribution of Perceived Stress Scale (PSS).

-	Never	Almost Never	Sometimes	Fairly Often	Very Often
Perceived Stress Scale	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
How often have you been upset because of something that happened unexpectedly?	4 (3.9)	8 (7.8)	31 (30.1)	33 (32.0)	27 (26.2)
How often have you felt that you were unable to control the important things in your life?	7 (6.8)	13 (12.6)	39 (37.9)	23 (22.3)	21 (20.4)
How often have you felt nervous and "stressed"?	5 (4.9)	7 (6.8)	25 (24.3)	33 (32.0)	33 (32.0)
How often have you felt confident about your ability to handle your personal problems?	9 (8.7)	10 (9.7)	36 (35.9)	27 (26.2)	21 (20.4)
How often have you felt that things were going your way?	7 (6.8)	20 (19.4)	42 (40.8)	30 (29.1)	4 (3.9)
How often have you found that you could not cope with all the things that you had to do?	11 (10.7)	19 (18.4)	40 (38.8)	25 (24.3)	8 (7.8)
How often have you been able to control irritations in your life?	9 (8.7)	20 (19.4)	38 (36.9)	27 (26.2)	9 (8.7)
How often have you felt that you were on top of things?	7 (6.8)	21 (20.4)	40 (38.8)	24 (23.3)	11 (10.7)
How often have you been angered because of things that were outside of your control?	3 (2.9)	11 (10.7)	35 (34.0)	34 (33.0)	20 (19.4)
How often have you felt difficulties were piling up so high that you could not overcome them?	5 (4.9)	21 (20.4)	31 (30.1)	29 (28.2)	17 (16.5)

Table 10. Significant changes that occurred during the COVID-19 pandemic.

-	Significant Decrease	Minor Decrease	No Difference	Minor Increase	Significant Increase
Changes	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Social activities of the child	32 (31.1)	29 (28.2)	23 (22.3)	14 (13.6)	5 (4.9)
Child's average screen time	9 (8.7)	13 (12.6)	24 (23.3)	28 (27.2)	29 (28.2)
Frequency of your child's sport/exercise activities	19 (18.4)	37 (35.9)	25 (24.3)	16 (15.5)	6 (5.8)
Time spent with friends (in-person or virtual)	27 (26.2)	29 (28.2)	22 (21.4)	15 (14.6)	10 (9.7)
Quality of time spent with family (parents or siblings)	5 (4.9)	26 (25.2)	36 (35.0)	25 (24.3)	11 (10.7)

(Table 10) contd.....

-	Significant Decrease	Minor Decrease	No Difference	Minor Increase	Significant Increase
Changes	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**
Frequency of conflicts between child and siblings	19 (18.4)	19 (18.4)	37 (35.9)	16 (15.5)	12 (11.7)
Frequency of conflicts between child and parents	16 (15.5)	20 (19.4)	37 (35.9)	22 (21.4)	8 (7.8)
Frequency of conflicts between parents	26 (25.2)	18 (17.5)	37 (35.9)	11 (10.7)	11 (10.7)
Child's sleep quality	7 (6.8)	19 (18.4)	43 (41.7)	26 (25.2)	8 (7.8)
Child's scholastic performance	14 (13.6)	28 (27.2)	27 (26.2)	25 (24.3)	9 (8.7)
Quality of relation of the child with his/her siblings	13 (12.6)	17 (16.5)	40 (38.8)	20 (19.4)	13 (12.6)
Quality of relation of the child with his/her parents	6 (5.8)	13 (12.6)	42 (40.8)	22 (21.4)	20 (19.4)
The need for mental health consultations for the child	12 (11.7)	16 (15.5)	32 (31.1)	30 (29.1)	13 (12.6)
Parents' work hours	8 (7.8)	14 (13.6)	48 (46.6)	22 (21.4)	11 (10.7)
Family income	15 (14.6)	31 (30.1)	44 (42.7)	10 (9.7)	3 (2.9)
Overall stresses faced by the family	12 (11.7)	14 (13.6)	18 (17.5)	42 (40.8)	17 (16.5)

Segenreich stated that the circumstances associated with the COVID-19 pandemic had a marked negative impact on the learning, social life, and quality of life of children with ADHD [32]. Moreover, the risk of discontinuing treatment, and its negative consequence on patients and their families, resulted in a pressing need to maintain remote monitoring, for instance through telehealth services [32]. Shah *et al*. added that during the lockdown period, worsening of symptoms was reported among children with ADHD, mainly in the form of increased activity levels (50.1%), irritability (45.8%), and disruptive behavior (47.7%) [.33] In terms of changes among family members, Shah *et al*. reported an increase in irritability (37.5%), shouting at the child (43.8%), verbal abuse (25%), and punishment (27.1%) [33]. On the other hand, there was also an increase in praising (67.6%) and spending time with the child (72.9%) [33].

Felt *et al*. stated that behavioral therapy (*e.g*., parent training, classroom management, and peer interventions) is mainly recommended for preschool-aged children with ADHD [29]. However, medications are recommended as first-line therapy for older children [29]. Wolraich *et al*. stressed that follow-up visits with the physician for patients with ADHD are important [34]. The present study indicated that only one-quarter of children with ADHD were compliant with regular follow-up visits. About one-third of children with ADHD were managed by both medication and behavioral therapy, about one-third received medication only, and almost one-quarter received behavioral interventions only. Improvement occurred in the condition of about two-thirds of children, while the condition of 29.1% did not change and 4.9% experienced deterioration in the course of illness.

The present study revealed some potential contributing factors for increased levels of stress among parents of children with ADHD, such as the child's ADHD subtype, especially predominantly hyperactive/impulsive presentation, and associated comorbidities, especially tic disorders, or autism spectrum disorder. Regarding contributing factors for high parental distress, Muñoz-Silva *et al*. noted that a high level of parental stress is not only due to the ADHD symptoms but also due to the comorbidities associated with ADHD,1 such as oppositional defiant disorder [15] or learning disabilities [16]. Moreover, Tzang *et al*. have identified that contributing factors for parental stress include maternal education, low social class, and single parenthood [35]. Moreover, ADHD combined subtype was highly associated with parental stress [35].

4.1. Study Strengths and Limitations

One of the strengths of this study is that it is the first study to evaluate stress levels among parents of children with ADHD in the United Arab Emirates. Additionally, it is one of the first studies worldwide to assess the impact of the COVID-19 pandemic on this population. Furthermore, the collected data covered various relevant information and potential contributing factors.

On the other hand, the present study has some limitations. Its design was cross-sectional, therefore it may generate hypotheses but, cannot establish causality. Moreover, it is based on one center and it has been claimed that single-center studies have limited external validity [36]. Furthermore, the survey did not include some variables that may contribute to increased stress, for instance, the duration between the onset of ADHD symptoms and the diagnosis of the disorder.

4.2. Implications and Areas for Future Research

The findings of the present study highlight the importance of exploring stress levels among parents of children with ADHD during clinical encounters. Additionally, it encourages more research in this field to understand the bio-psycho-social contributing factors in more depth. This will likely assist in developing support services accordingly. Furthermore, research on the impact of challenges associated with the COVID-19 pandemic covering a wider population of families of children with various mental health and neurodevelopmental disorders is strongly warranted.

CONCLUSION

Parents of children with ADHD commonly experience high levels of stress, which can eventually increase their children's challenges and psychological maladjustment. Elevated stress levels present in the form of emotional disturbance and difficulties in coping. Various factors likely contribute to increased distress and the recent COVID-19 pandemic has also had a marked impact. A thorough understanding of parents' challenges is critical and will likely contribute to enhancement in developing tailored management

approaches towards the needs of the child as well as the family.

LIST OF ABBREVIATIONS

ADHD	=	Attention-deficit/ hyperactivity disorder
UAE	=	United Arab Emirates
PSS	=	Perceived Stress Scale

AUTHORS' CONTRIBUTIONS

Dr. Tamim Alghamdi contributed by developing the research question, study design, literature review, developing electronic survey, obtaining consent from the participants, data analysis, and manuscript preparation. Ms. Maya Helou contributed to developing the research question, study design, literature review, and manuscript preparation. Prof. Lakshmanan Jeyaseelan contributed to the sample size calculation and conducted the data analysis. He also contributed to the manuscript preparation. Dr. Meshal A. Sultan contributed to developing the research question, study design, literature review, revision of the data analysis, and manuscript preparation, and supervised the research project.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study obtained the Dubai Scientific Research Ethics Committee Approval Letter on 31 January 2022, Ref: DSREC-01/2022_19.

HUMAN AND ANIMAL RIGHTS

No animals were used in this study. All procedures performed in studies involving human subjects were in accordance with the ethical standards of the institutional and/or research committee and with the 1975 Declaration of Helsinki as revised in 2013.

CONSENT FOR PUBLICATION

Participation depended on reading and signing an electronic consent form.

AVAILABILITY OF DATA AND MATERIAL

The datasets and materials used and/or analyzed during the current study can be made available from the corresponding author [M.A.S] on a reasonable request.

STANDARDS OF REPORTING

STROBE guidelines were followed in this study.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest financial or otherwise.

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