The Prevalence Of Attention Deficit Hyperactivity Disorder (adhd) Among Elementary School Children: The Effect Of Certain Demographic Variables

Tagreed Ameen Zagzoog, Rehab Mohammed Samy Elshazly and Mohammad Sayed Said Soliman

The study aimed to determine the prevalence of ADHD symptoms in Saudi children aged 6 to 13 years in Jeddah city. The study also explored the effect of variables namely teacher's knowledge, years of experience and teachers' gender on reported ADHD symptoms among primary grade students. A questionnaire survey methodology was adopted for the study. 550 children were included in the teachers' survey. Teachers assessed the ADHD symptoms in children using an 18-item scale based on DSM-V. The results indicated that the prevalence rates of ADHD among school-age differed according to ADHD subtypes. The Inattention type was rated by 35.34%, Hyperactivity/Impulsivity type was rated by 28.60%, and ADHD-C type was rated by 21.3% of the respondents. According to gender, for the Inattention subtype, the ratio between boys and girls was 1.7:1, for the Hyperactivity/Impulsivity subtype, the ratio between boys and girls was 2.03:1, and for combined subtype, the ratio between boys and girls was 2.2:1. According to the grade level, the highest prevalence of ADHD overall was found in grade three and the lowest prevalence was in grade six in all ADHD types. The present findings indicated that teachers' knowledge and gender (female) successfully predicted teacher-rated ADHD status.

Dr. Tagreed Ameen Zagzoog ✉
Assistant Professor, Childhood Studies Department, College of Human Sciences and Designs, King Abdulaziz University, Saudi Arabia
Email: tzagzoog@kau.edu.com

Dr. Rehab Mohammed Samy Elshazly
Assistant Professor, Childhood Studies Department, College of Human Sciences and Designs, King Abdulaziz University, Saudi Arabia

Dr. Mohammad Sayed Said Soliman
Associate Professor, Special Education, College of Psychology Department, Arts and Education Faculty, Northern Border University, Saudi Arabia
Email: aiaamlomar@hotmail.com

INTRODUCTION

According to the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5), Attention-Deficit / Hyperactivity Disorder (ADHD) is characterized by a persistent pattern of inattention or hyperactivity-impulsivity that interferes with functioning or development (American Psychiatric Association, 2013). The results of previous studies indicated that this disorder is associated with a wide range of negative outcomes for both children and adolescents, including low academic achievement, low social skills, family and community economic burden and low occupational performance (Birnbaum et al., 2005). ADHD symptoms will continue into adulthood in 30-60% of the affected children (Harpin, 2005; Weiss, 1993). As children with ADHD move into adulthood, they experience more difficulties obtaining employment, have higher rates of psychiatric disorder (such as depression, personality disorder, substance abuse, and so forth), have more auto accidents, and are more likely to contract sexually transmitted diseases compared to adults without childhood ADHD (Barbaresi et al., 2013).

Meta-analysis studies by Polanczyk et al. (2007) indicated that the worldwide prevalence of ADHD among children and adolescents is 5.3% while Willcutt (2012) reported that the prevalence rate is 5.9%. Recently, meta-analysis conducted with 175 eligible studies across the world, the prevalence of ADHD among children and adolescents is 7.2% (Thomas et al., 2015). As we see, an increased rate of ADHD prevalence by 1.8% between 2007 and 2015, from 5.3% to 7.2% has been detected.

Although the causes of discrepancy in studies aimed at detecting prevalence of ADHD are still unclear, some researchers have hypothesized that different research methodologies used (teachers, parents, physicians) differ in the types of samples (clinical samples, School samples, class cluster samples), different scales applied (e.g., ICD, DSM-IV, DSM-V) and cultural and geographical differences (Senol et al., 2018; Rappley, 2005).

Prevalence studies on ADHD among Arab countries, are said to be scarce and have limited information. The results of a meta-analysis carried out by Farah et al. (2009) indicate that prevalence rates of ADHD for students in Arab countries at school age ranged between 5.1% and 14.9%. A recent review identified 26 ADHD prevalence studies in Arab countries over the past 25 years, has reported range rate from 1.3% to 34.5% (Alkhateeb & Alhadidi, 2016).

In Saudi Arabia, five studies exploring the prevalence of ADHD have been reported. Al Hamed et al., (2008) explored the prevalence rate of ADHD among school-aged children in Dammam city of Saudi Arabia. Study sample consisted of 1287 pupils from first grade to sixth grade. The authors surveyed both

77 | Tagreed Ameen Zagzoog, Rehab Mohd. Samy Elshazly & Mohd. Sayed Said Soliman

Prevalence of Attention Deficit Hyperactivity Disorder | 78

teachers and parents. The study results indicated that the prevalence rates of ADHD-IA type, ADHD-HI type and ADHD-C type were 16.3%, 12.4% and 16.4% respectively. Alqahtani's study (2010) aimed at detecting the prevalence of ADHD among school-aged children. Teachers and parents were surveyed for 708 school-age children. The study result indicated an overall rate of ADHD prevalence by 2.7%. Jenahi et al, (2012) studied the prevalence rate of ADHD among 1009 female students with range of 6-15 years in Al-Khobar city. The authors surveyed teachers only. The prevalence of children with ADHD/IA type, ADHD-HI type and ADHD-C type were 2.1%, 5.6% and 3.5% respectively. Homidi et al., (2013) studied the prevalence of ADHD among 2770 primary school-aged children in Jeddah city. Teacher ratings were used as only information screening source. The result showed that the prevalence rate was estimated to be 11.6%. A prevalence rate of children with ADHD/IA type, ADHD-HI type and ADHD-C type were 6.3%, 2.2% and 3.1%. Recently, Alzaben et al. (2018) investigated the prevalence rate of ADHD among 929 students from three male and three female primary government schools in Jeddah. Teachers were surveyed via Vanderbilt ADHD scale. The study results specified that the prevalence rate of children with ADHD/IA type, ADHD-HI type and ADHD-C type were 2.7%, 1.2% and 1.1%. The overall rated was 5%.

The absence of information regarding the prevalence rate of ADHD in the school-aged population hinders the development of therapeutic, educational services and leading to increase problematic consequences of this disorder (Sanchez et al., 2011). In addition, detecting the prevalence rate of ADHD data helps in the development of public policy and mental health programmes for children and adolescents with ADHD. Due to the nature of ADHD and its negative outcomes that continue to adulthood, the detection of its prevalence rates has been an urgent necessity and a critical research aim around the world, especially in developing countries, because of its effects on the national economy (Catherine et al., 2019).

On the other hand, Rating scales of ADHD assessment have been valuable tools for examining school or community-based samples. Studies have used teachers alone (Homidi et al., 2013) (Jenahi et al., 2012) (Alzaben et al., 2018), parents alone (Danielson et al., 2018) or teachers and parents (Alhamed, 2008; Alqahtani, 2010) as primary sources in the diagnosis of ADHD. The role the teacher plays in ADHD's evaluation is critical, this may be related to the nature of his responsibilities that indicate monitoring of students from all sides of pedagogic environments (Atkins et al., 1985; De Nijs et al., 2004) and knowledge of behaviour that suit the children's age (Lauth et al., 2006). Teacher ratings are critically important for valid diagnosis of ADHD for three reasons. First, ADHD symptoms may not be evident in controlled situations such as clinic-based evaluations. Second, ADHD behaviour tends to be seen as the inverse of successful behaviour in schools (Hinshaw& Scheffler 2014). Taylor and Sonuga (2008) suggested that a short-cut for ADHD evaluation is to accept the judgment of experienced teachers regarding atypical behaviour and performance.

Although Schmitz et al., (1996) note that teachers are able to observe a wide range of behavioural symptoms for students. They can determine their relevance to students and refer them to the next stages of diagnosis for a final decision, there is a growing evidence that teachers' ratings may be affected by various factors. Oner et al., (2019) reported that teacher rated ADHD symptoms were 2.5 to 3.6 times more common in students who were younger for their grade, after age, gender, and Fluid IQ scores were controlled. Teacher referral rates for boys with hyperactivity/impulsivity more than girls for clinicians have been reported by Isaksson et al., (2016). On the other hand, Hosterman et al., (2008) in their study indicated that teacher ratings were not affected by ethnicity of students. Stevens et al., (1998) also revealed that knowledge, education, and experience with children with ADHD had no effect on the accuracy of ADHD teachers' ratings. Anastopoulos et al., (2018) recommended that future research should examine the impact of years of experience in teacher ratings. No previous studies have examined the effect of gender informant in ADHD expect Anastopoulos et al. (2018). The reasons for this are not specific and it may be attributed to the assumption that there is no difference between male and female adults in their perceptions of children's behaviour. The results of Anastopoulos et al. (2018) indicated that gender information may play a key role in the classification of ADHD disorder and determine its severity in children and adolescents. To date, in Arab Countries, there were no studies aimed to explore the influencing factors of teachers' ratings of ADHD. Hence, the current study aims to explore the effects of teachers' knowledge of ADHD, teachers' gender and years of experience on teachers' ratings.

The aims of this study were two-fold: (i) to determine the prevalence of Saudi children aged 6 to 13 years with probable ADHD symptoms in Jeddah city; and (ii) to explore whether there was a significant effect of teachers' knowledge, years of experiences and teachers' gender on teacher reported ADHD symptoms among primary grade students.

TOOL USED IN THE STUDY

In this study, the ADHD Rating Scale by Aboul-ata and Amin (2018) was used. It is an 18-item scale based on the diagnostic criteria for ADHD as described in the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders of

the American Psychiatric Association (DSM-V, American Psychiatric Association, 2013) and can be completed by teachers (school version). Rating scale of the tool varies from 0 (rarely) to 3 (always). Ratings of "often" and "always" for each item were considered positive, as done in other similar studies. The scale provides scores for inattention symptoms, hyperactivity/ impulsivity symptoms and total score. According to the explanatory factor analyses, the ADHD rating scale has two factors with 18 items; Inattentive subscale (9 items), and Hyperactivity/ Impulsivity subscale (9 items), respectively. The Cronbach Alpha internal consistency coefficient of the whole scale for the current study was 0.93, , 0.91 for the first factor and 0.89 for the second factor. Confirmatory factor analysis was conducted to test the validity of the scale which confirmed the two-factor structure of the scale ($2\chi/sd=1.86$, RMSEA=0.067, SRMR= 0.088, CFI=0.91, NFI=0.91, GFI=0.96, NFI=0.97, AGFI=0.94).

SAMPLE OF THE STUDY

A random clustered sampling technique was used to select 550 children aged between 6 and 13 years, admitted in several schools across all regions in Jeddah city. In each of the four administrative regions (North, South, Middle, and East), four districts were selected. In each district, two schools were chosen by random sampling and in each school, we selected all grades (from 1 to 6) from the selected schools. From every class, 11 children were included by random sampling in the population of the study. The sampling method resulted in inclusion of 550 participants for the final study. According to the education system in the Kingdom of Saudi Arabia (KSA), there are separate schools for girls and boys, and having female research assistants, it was considerably easier to access girls' schools. Hence, the study included 475 girls (86.4%) and 75 boys (13.6%). The inclusion of children was based on three criteria 1) the age range was between 6 and 13 years for both boys and girls 2) random selection by the class teachers was done and 3) approval of each child's parents for participating in the study was taken through a written consent. Exclusion criteria for the students were based on the history or current neurological disorders or intellectual disabilities, children who were foreigners, and those whose parents did not give the written consent.

RESULTS OF THE STUDY

The associations of probable ADHD and subtype symptoms with gender and grade level of participants were assessed using the Chi-square test.

Overall Prevalence According to ADHD Type.

The findings indicated that the prevalence rates of ADHD among school-age children in Jeddah City (see Table 1) differed according to ADHD sub-types. Inattention type was rated by 35.34%, Hyperactivity/Impulsivity type was rated by 28.60%, and ADHD-C type was rated by 21.3% of respondents.

Prevalence According to Gender

For the Inattention subtype, the ratio between boys and girls was 1.7:1. The Chi square test indicated a significant difference in ADHD prevalence by gender, $\chi2(1, N = 549) = 15.328$, $p < 0.001$. For the Hyperactivity/Impulsivity subtype, the ratio between boys and girls was 2.03:1. The Chi square test indicated a significant difference in ADHD prevalence by gender, $\chi2 (1, N = 549) = 22.297$, $p < 0.001$. Lastly, for Combined subtype, the ratio between boys and girls was 2.2:1 (see table 1). The Chi square test indicated a significant difference in ADHD prevalence by gender, $\chi2 (3, N = 549) = 20.739$, $p < 0.001$.

Prevalence According to Grade Level

With regards to grade level (Table 1), the prevalence rate of ADHD was different according to ADHD-subtypes. The highest prevalence of ADHD overall was found in grade three (7.29%) and the lowest prevalence was in grade six (2.91%) for Inattentive subtype. The Chi square test indicated a significant difference in ADHD prevalence by grade level, $\chi2 (6, N = 549) = 25.107$, $p < 0.001$. For Hyperactivity/Impulsivity subtype, the highest prevalence of ADHD overall was found in grade three (6.56%) and the lowest prevalence was in grade six (2.55%). The Chi square test indicated a significant difference in ADHD prevalence by grade level, $\chi2 (6, N = 549) = 17.845$, $p < 0.001$. For the Combined subtype, the highest prevalence of ADHD overall was found in grade three (5.23%) and the lowest prevalence was in grade six (1.64%). The Chi square test showed a significant difference in ADHD prevalence by grade level, $\chi2 (6, N = 549) = 31.465$, $p = 0.03$.

Table 1

Prevalence of ADHD Subtypes by Gender and Grade Level.

		ADHD Subtypes							
		In-			HI-			CT-	
Gender	N	%	P value	n	%	P value	n	%	P value
Male (n=77)	42	54.54	< 0.01	39	50.65	< 0.01	31	40.26	< 0.01
Female (n=472)	152	32.20		118	25		86	18.22	
Grade									
First	32	5.83		29	5.28		22	4.01	
Second	31	5.65		25	4.55		23	4.19	
Third	40	7.29		36	6.56		28	5.23	
Fourth	39	7.10	< 0.01	30	5.46	< 0.01	18	3.28	0.03
Fifth	35	6.38		22	4.20		16	2.91	
Sixth	16	2.91		14	2.55		9	1.64	
Overall	194	35.34		157	28.60		117	21.31	

To achieve the second aim of the study and to determine the teacher variables independently associated with teacher rated ADHD status, logistic regression analysis was used. The variables included in the model were teacher rated ADHD status as dependent variable and teachers' knowledge of ADHD, years of experience, and teachers' gender as independent variables. Regarding the ADHD/IA the logistic regression analysis indicated that the final model was able to explain a range of variance ranging from 4.8 % to 6.6%. The model was found to be adequate for the data (Hosmer and Lemeshow's x2=6.097, p=0.636) and was able to predict teacher rated ADHD status (Omnibus x2(4) = 27.004, p≤0.001). Overall, the model was able to predict (65.9%) of all cases correctly. By the enter method, four predictors were included in the model; low teacher knowledge, moderate teacher knowledge, teachers' years of experiences and teacher gender(female). Two of these; moderate teacher knowledge and teacher gender (female) successfully predicted teacher rated ADHD status. Assumptions for linearity and multicollinearity were convinced (see Table 2).

Table 2

Factors Associated with Teacher Rated ADHD Status (IA) in the Logistic Regression Analysis.

	Cox & Snell R²	Nagelkerke R²	HL x2	Sig	Wald 2	df	P	Exp(B)
Model	0.048	0.066	6.097	0.636				
Teacher Knowledge (1)					2.341	1	0.126	0.572
Teacher Knowledge (2)					9.009	1	0.003	0.390
Years of Experience					0.528	1	0.468	0.991
Gender (1) (female=1)					13.439	1	0.000	2.537
Constant					0.241	1	0.624	1.198

(N = 549)

Regarding the ADHD/HI the logistic regression analysis indicated that the final model was able to explain a range of variance ranging from 5.9% to 8.4%. The model was found to be adequate for the data (Hosmer and Lemeshow's x2=8.127, p=0.568) and was able to predict teacher rated ADHD status (Omnibus x2(4) = 32.260, p≤0.001). Overall, the model was able to predict (71.6%) of all cases correctly. By the enter method, four predictors were included in the model i.e. low teacher knowledge, moderate teacher knowledge, teachers' years of experiences and teachers' gender (female). Three of these i.e. low teacher knowledge, moderate teacher knowledge and teacher gender (female) successfully predicted teacher rated ADHD status. Assumptions for linearity and multicollinearity were also convincing (see Table 3).

Table 3

Factors Associated with Teacher Rated ADHD Status (HI) in the Logistic Regression Analysis.

	Cox & Snell R²	Nagelkere R²	HL x2	Sig	Wald2	df	P	Exp(B)
Model	0.059	0.084	18.687	0.027				
Teacher Knowledge (1)					9.711	1	0.002	0.304
Teacher Knowledge (2)					12.810	1	0.000	0.321
Years of Experience					0.434	1	0.510	0.991
Gender (1) (female=1)					19.470	1	0.000	3.119
Constant					0.026	1	0.871	1.063

(N = 549)

83 | Tagreed Ameen Zagzoog, Rehab Mohd. Samy Elshazly & Mohd. Sayed Said Soliman

Prevalence of Attention Deficit Hyperactivity Disorder | 84

The ADHD/C the logistic regression analysis indicated that the final model was able to explain a range of variance ranging from 5.7% to 8.8%. The model was found to be adequate for the data (Hosmer and Lemeshow's $x2=6.474$, $p=0.594$) and was able to predict teacher rated ADHD status (Omnibus $x2(4) = 31.964$, $p≤0.001$). Overall, the model was able to predict (78.6%) of all cases correctly. By the enter method, four predictors were included in the model i.e. low teacher knowledge, moderate teachers' knowledge, teachers' years of experiences and teachers' gender (female). Three of these i.e. low teachers' knowledge, moderate teachers' knowledge and teachers' gender (female) successfully predicted teacher rated ADHD status. Assumptions for linearity and multicollinearity were also convincing (see Table 4).

Table 4

Factors Associated with Teacher Rated ADHD Status (C) in the Logistic Regression Analysis .

	Cox & Snell R²	Nagelkerke R²	HL x2	Sig	Wald2	df	P	Exp(B)
Model	0.057	0.088	6.474	0.594				
Teacher Knowledge (1)					4.769	1	0.029	0.426
Teacher Knowledge (2)					12.680	1	0.000	0.311
Years of Experience					0.056	1	0.813	0.997
Gender (1) (female=1)					18.837	1	0.000	3.194
Constant					1.428	1	0.232	0.623

(N = 549)

DISCUSSION OF RESULTS

The aim of this study was to present data regarding the prevalence of attention deficit hyperactivity disorder in Jeddah city (KSA) from a population based and sufficiently large sample. A teacher assessment scale was used based on DSM-V diagnostic criteria. The overall prevalence rate estimated in the study according to ADHD subtype that included ADHD-IA, ADHD-HI and ADHD-C were 35.34%, 28.60%, and 21.31%, respectively (see Table 1). According to the American Psychiatric Association (APA) the estimated range of ADHD is 3-7% worldwide. Research studies have shown prevalence rate up to 17.8% (Huss et al., 2008; Biederman & Faraone, 2005; Alison 2018; Bianchini et al., 2013; Catala et al., 2012; Ford et al., 2003). In a study done in Tehran, the prevalence of ADHD was estimated to be 12.3% (Meysamie et al., 2011). In another study to compare ADHD prevalence between Jewish children and Muslim children in Jerusalem, the rate was 9.5% and 7.35% respectively (Ornoy et al., 2016). A 4-year longitudinal study in Turkey showed a 13.38% rate (Ercan et al., 2013). The present study shows the highest rate of all, but since questionnaire used in the study was a screening test this prevalence rate can be lower after eventually diagnosis confirmed by a psychiatric interview. Timimi and Taylor (2004) mentioned in their paper that interaction between child and the expectations of the adult is very important in making a decision about diagnosis than just accepting a rating from a parent or teacher. Studies have shown that the estimated prevalence of ADHD symptoms differs depending on the study methodology, diagnostic criteria, and demographic characteristics of the population, such as gender, age, ethnicity and also depending on the person evaluating the symptoms. Another possible explanation for this discrepancy is that teachers expect the children to be well behaved and obedient, thus evaluating their behaviour more strictly. This expectation may be especially high for teachers of girls as in the case of the study.

As expected, boys were diagnosed with ADHD significantly more frequently than girls. For the Inattention subtype, the ratio between boys and girls was 1.7:1. For the Hyperactivity/Impulsivity subtype, the ratio between boys and girls was 2.03:1. For Combined subtype, the ratio between boys and girls was 2.2:1. These results coincide with results from Egger et al. (2006), in their study with ratio of boys to girls with ADHD 1.6:1.

With regard to grade level (Table 1), the highest prevalence of ADHD overall was found in grade 3 (7.29%) and the lowest prevalence was in grade 6 (2.91%). This coincides with results of Ercan et al., (2013) in his 4 year study with lowest rate at the last wave of assessment. This may be due to increased task demands associated with schooling.

The present findings indicated that teachers' knowledge (moderate) predicated teacher rated ADHD status for Inattention type, and teachers' knowledge (low and moderate) predicated teacher rated ADHD status for HI-type, and ADHD-C type. These finding are consistent with Ohan et al., (2008) as they indicated that teachers' knowledge consistently impacted how teachers reported they perceived children with ADHD. This is due to possession of information about ADHD symptoms, leading to adequate awareness of ADHD assessment. Relative to those with average knowledge, teachers with low knowledge may rate ADHD symptoms as a function of its undesirable outcomes in their classrooms. On the other hand, teachers with high knowledge may perceive ADHD symptoms with less rating than those with average knowledge because they may be thinking that the way to rate children with ADHD is via clinicians and not any other persons. Our findings reveal

that students with ADHD who are in the classrooms of teachers with average knowledge, and to some extent those with low knowledge, may experience better assessment than students who are in the classrooms of teachers with high knowledge. To sum up, the present study contributes to research studies on teachers' ADHD knowledge and also demonstrates the impact of this knowledge on reported teacher rated students with ADHD. The results found suggest that low, and to some extent average, knowledge of ADHD may impact teachers' rated ADHD.

The present findings indicated that teachers' gender (female) successfully predicted teacher rated ADHD status for Inattention type, HI-type, and ADHD-C type. The current result is consistent with Anastopoulos et al. (2018) who indicated that gender information may play a key role in the classification of ADHD disorder and determine its severity in children and adolescents. The reason for that result may be attributed to the fact that adult females are more likely to provide information about a child's behaviour in school settings because they are generally more accessible and more knowledgeable. Such an explanation may be a simplification of a more complex clinical phenomenon in nature. Hence, replication studies should be undertaken to determine whether a similar pattern of gender differences occurs in other studies. The results of the current study, however, indicated that teachers' years of experience has failed to predict teacher rated ADHD status. To the best of our knowledge, such a finding has not been previously reported. That said, additional studies should be done on this issue using a larger sample of in-service teachers. One of the limitations of this study was the limited generalization of the results due to the small size of the research sample of teachers.

RECOMMENDATIONS OF THE STUDY

The following are some of the recommendations of the study: a) Several interventions must be implemented to reduce the prevalence of ADHD. These interventions should be directed to the child and the family, primary health care services, school and society throughout the developmental stages of the child life. b) Parent training programmes should be developed to increase parenting skills. These training programmes should focus on increasing parents' skills in managing their children's behaviour, facilitating the development of social skills, and encouraging positive parenting interaction with their child. c) School health services need to alert school teachers to have enough knowledge of ADHD that helps them in referring and diagnosing students with ADHD. d) School teachers also need to focus on further developing the skills associated with managing behaviour of students with ADHD. We also recommend expanding the study across the Kingdom, and we also suggest conducting a comparative study between teachers and parents in diagnosing ADHD.

CONCLUSIONS

The results of the showed a higher prevalence in Jeddah City among school-age children in comparison with international, and the Arab world prevalence rates. For the Inattention type the prevalence rate was 35.34%, for the hyperactivity/Impulsivity type it was 28.60%, and for the ADHD-C type it was 21.3%. Results indicated that ADHD affects boys more than girls. It is also more common among the lower grade students (third grade) than higher grade students (sixth grade). This high prevalence may have stemmed from three reasons a) the gender equality b) using rating scales and c) one type of informant only (teachers rather than parents). The present findings indicated that teacher knowledge and gender (female) successfully predicted teacher rated ADHD status.

ACKNOWLEDGEMENTS

REFERENCES

Aboul-ata, M., & Amin, F. (2018). The prevalence of ADHD in Fayoum City (Egypt) among school-age children: Depending on a DSM-5-based rating scale. *Journal of Attention Disorders*, 22(2), 127–133.

Al Hamed, J. H., Taha, A. Z., Sabra, A. A., & Bella, H. (2008). Attention deficit hyperactivity disorder (ADHD) among male primary school children in Dammam, Saudi Arabia: Prevalence and associated factors. *Journal of the Egyptian Public Health Association*, 83, 165-182.

Alkhateeb, J. M., & Alhadidi, M. S. (2016). ADHD research in Arab countries: A systematic review of literature. *Journal of Attention Disorders*, 1-15.

Alqahtani, M. M. (2010). The comorbidity of ADHD in the general population of Saudi Arabian school-age children. *Journal of Attention Disorders*, 14, 25-30.

Alzaben, F., Sehlo, M., Alghamdi, W., Tayeb, H., Khalifa, D., Mira, A.,

87 | Tagreed Ameen Zagzoog, Rehab Mohd. Samy Elshazly & Mohd. Sayed Said Soliman

Prevalence of Attention Deficit Hyperactivity Disorder | 88

Alshuaibi, A., et al. (2018). Prevalence of attention deficit hyperactivity disorder and comorbid psychiatric and behavioural problems among primary school students in western Saudi Arabia. *Saudi Medical Journal*, 39(1), 52-58.

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders (5th ed.), Changes from DSM-IV to DSM -5*. Washington, DC.

Anastopoulos, A. D., Beal, K. K., Reid, R. J., Reid, R., Power, T. J., & DuPaul, G. J. (2018). Impact of child and informant gender on parent and teacher ratings of attention-deficit/hyperactivity disorder. *Psychological Assessment*, 30(10), 1390–1394.

Atkins, M. S., Pelham, W. E., & Licht, M. H. (1985). A comparison of objective classroom measures and teacher ratings; of attention deficit disorder. *Journal of Abnormal Child Psychology*, 13, 155-167.

Barbaresi, W., Colligan, R., Weaver, A., Voight, R., Killian, J., & Katusic, S. (2013). Mortality, ADHD, and psychosocial adversity in adults with childhood ADHD: A prospective study. *Paediatrics*, 131(4), 1-8.

Bianchini, R., et al., (2013). Prevalence of ADHD in a sample of Italian students: A population-based study. *Research in Developmental Disabilities*, 34(9), 2543-2550.

Biederman, J., & Faraone S. (2003). Attention-deficit hyperactivity disorder. *Lancet*, 366(9481), 237-48.

Birnbaum, H.G., Kessler, R.C., lowe, S.W. (2005). Costs of attention deficit–hyperactivity disorder (ADHD) in the US : Excess cost of persons with ADHD and their family members in 2000. *Current Medical Research and Opinion*, 21, 195-205.

Catalá-López, F., et al. (2012). Prevalence of attention deficit hyperactivity disorder among children and adolescents in Spain: A systematic review and meta-analysis of epidemiological studies. *BMC psychiatry*, 12(1), 168.

Catherine, G., Robert, G., Mala, K., Kanniammal, C., & Arullapan, J. (2019). Assessment of prevalence of attention deficit hyperactivity disorder among schoolchildren in selected schools. *Indian Journal of Psychiatry*, 61, 232-237.

Danielson, M., Bitsko, R., Ghandour, R., Holbrook, J., Kogan, M., & Blumberg, S. (2018). Prevalence of parent-reported ADHD diagnosis and associated treatment among U.S. children and adolescents. *Journal of Clinical Child & Adolescent Psychology*, 47(2), 199–212.

De Nijs, A., Ferdinand, F., De Bruin, I., Dekker, J., Van Duijn, M., & Verhulst, C. (2004). Attention-deficit/hyperactivity disorder (ADHD): parents' judgment about school, teachers' judgment about home. *European Child and Adolescent Psychiatry*, 13, 315-320.

Egger, H.L., Erkanli, A., Keeler, G., Potts, E., Walter, B.K., Angold, A. (2006). Test retest reliability of the preschool age psychiatric assessment (PAPA). *Journal of the American Academy of Child and Adolescent Psychiatry, 45*, 538-49.

Ercan, E.S., Kandulu, R., Uslu, E., Ardic, U.A., Yazici, K.U., Basay, B.K., Aydin, C., & Rohde, L.A. (2013). Prevalence and diagnostic stability of ADHD and ODD in Turkish children: A 4 year longitudinal study. *Child and Adolescent Psychiatry and Mental Health*, 7, 30.

Farah, L. G., Fayyad, J. A., Eapen, V., Cassir, Y., Salamoun, M. M., Tabet, C. C., & Karam, E. G. (2009). ADHD in the Arab world: A review of epidemiologic studies. *Journal of Attention Disorder*, 13, 211-222.

Ford, T., R., Goodman, H. & Meltzer. (2003). The British child and adolescent mental health survey 1999: The prevalence of DSM-IV disorders. *Journal of the American Academy of Child & Adolescent Psychiatry*. 42(10), 1203-1211.

Hinshaw, S., & Scheffler, R. (2014). *The ADHD explosion*. New York, NY: Oxford University Press.

Homidi, M., Obaidat, Y., & Hamaidi, D. (2013). Prevalence of attention deficit and hyperactivity disorder among primary school students in Jeddah city, KSA. *Life Science Journal*, 10, 280-285.

Hosterman, J., DuPaul, J., & Jitendra, K. (2008). Teacher ratings of ADHD symptoms in ethnic minority students: Bias or behavioural difference? *School Psychology Quarterly*, 23, 418–435.

Huss, M., Holling, H., Kurth, B., and Schlak, R. (2008). How often are German Children and adolescents diagnosed with ADHD? Prevalence based on the judgment of health care professionals: results of the German health and examination survey (KIGGS). *European Child & Adolescent Psychiatry*, 17, 52-58.

Isaksson, J., Ruchkin, V., & Lindblad, F. (2016). Unseen and stressed? gender differences in parent and teacher ratings of ADHD symptoms and associations with perceived stress in children with ADHD. *Journal of Attention Disorders*, 1-5.

Jenahi, E., Khalil, M. S., & Bellac, H. (2012). Prevalence of attention deficit hyperactivity symptoms in female schoolchildren in Saudi Arabia. *Annuals of Saudi Medicine*, 32, 462-468.

Lauth, G.W., Heubeck, B.G., & Mackowiak, K. (2006). Observation of children with attention-deficit hyperactivity (ADHD) problems in three natural classroom contexts. *British Journal of Educational*

89 | Tagreed Ameen Zagzoog, Rehab Mohd. Samy Elshazly & Mohd. Sayed Said Soliman

Prevalence of Attention Deficit Hyperactivity Disorder | 90

Psychology, 76, 385–404.

Meysamie, A., Fard, M.D., & Mohammadi, M.R. (2011). Prevalence of attention-deficit/hyperactivity disorder symptoms in preschool-aged Iranian children. *Iranian Journal of Pediatrics*, 21(4), 467.

Ohan, J., Cormier, N., Hepp, S., Visser, T., & Strain, M. (2008). Does knowledge about attention-deficit/hyperactivity disorder impact teachers' reported behaviours and perceptions? *School Psychology Quarterly*, 23, 436-449. http://dx.doi.org/10.1037/1045-3830.23.3.436.

Oner, O., Vatanartıran, S., & Karadeniz, S. (2019). Grade effects on teacher ratings of ADHD symptoms among primary school students. *Scandinavian Journal of Psychology*, 1-5.

Ornoy, A., Ovadia, M., Rivkin, D., Milshtein, E., & Barley, L. (2016). Prevalence of ADHD among 7-9-year-old children in Israel. A comparison between Jewish and Arab populations. *Israel Journal of Psychiatry and Related Sciences*, 53, 3-9.

Polanczyk, G., De Lima, M., Horta, B.L., et al. (2007). The worldwide prevalence of ADHD: a systematic review and meta regression analysis. *American Journal of Psychiatry*, 164, 942-948.

Sánchez, E., Velarde, S., & Britton, G. (2011). Estimated prevalence of Attention-Deficit/Hyperactivity Disorder in a sample of Panamanian school-aged children. *Child Psychiatry & Human Development*, 42, 243–255.

Schmitz, S., Saudino, J., Plomin R., Fulker, W., & DeFries, C. (1996). Genetic and environmental influences on temperament in middle childhood: Analyses of teacher and tester ratings. *Child Development*, 67, 409–422.

Senol, V., Unalan, D., Akca, R., & Basturk, M. (2018). Prevalence of attention deficit/ hyperactivity and other disruptive behaviour disorder symptoms among primary school-age children in Kayseri, Turkey. *Journal of International Medical Research*, 46(1), 122-134.

Stevens, J., Quittner, A.L., & Abikoff, H. (1998). Factors influencing elementary school teachers' ratings of ADHD and ODD behaviours. *Journal of Clinical Child Psychology*, 27, 406–414.

Taylor, E., & Sonuga-Barke, E.J. (2008). *Disorders of attention and activity*. In M. Rutter, D.V. Bishop, D. Pine, S. Scott, J. Stevenson, E. Taylor, & A. *Thapar (Eds.), Rutter's textbook of child psychiatry* (5th ed, pp. 521–542). Oxford, UK: Blackwell.

Thomas, R., Sanders, S., Doust, J., Beller, E., & Glasziou, P. (2015). Prevalence of attention-deficit/hyperactivity disorder: A systematic review and meta-analysis. *Paediatrics*, 135, 994-1001.

Timimi, S., & Taylor, E. (2004). ADHD is best understood as a cultural construct. *British Journal of Psychiatry*, 184, 8-9.

Weiss, G., Hechtman, L. (1993). *Hyperactive children grown up: ADHD in children, adolescents and adults*. New York: Guildford, 1993.

Willcutt, E.G. (2012). The prevalence of DSM-IV attention-deficit/ hyperactivity disorder: A meta-analytic review. *Neurotherapeutics*, 9(3), 490-499.