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Investigating Attention Deficit/Hyperactivity Disorder (ADHD) in selected elementary schools in district 4 of Tehran in year 2018

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Abstract

Attention Deficit/Hyperactivity Disorder(ADHD)is the most common emotional, cognitive, and behavioral disorder. Mostly neglected, pre-activator-impulsive and combination type, including three types of ADHD, are considered DSM-IV criteria. The studying ADHD was conducted in elementary schools in District 4 of Tehran in year 2018. In this quasi-experimental study; we grouped 100 primery students into two groups in 2018. We collected the data by a researcher-made questionnaire including demographic(16) and knowledge(21) questions that used four-point Liker scales. The results of the research in the knowledge and performance of 5 girlish schools indicated that the average score of knowledge was 8.08±6.98(0-21), the performance score was 8.23±4.39(1-21). Knowledge and practice score of physical activity was3.4±2.74 and3.46±.01, respectively. Knowledge and practice score of food intake was 3.14±2.96 and 3.8±2.01, respectively. The results of the research in the Knowledge and Performance of 5 boys' schools showed that the average score of knowledge was 4.96±6.91(0-21), the score of performance was 4.72±4.57(1-21), the score of knowledge and practice of physical activity were 2.82±2.5 and 3.8±2.01, respectively. Knowledge and practice score of food intake were 1.84±2.57 and 3.20±1.88 respectively. It is concluded that the use of exercise and diet food programing are recommended for the improvement of children with ADHD.

Keywords: "Attention deficit/hyperactivity disorder (ADHD)," "District," "Elementary schools," "Pre-test/post-test Tehran,".

Introduction

Children with learning abilities are born. Providing children's needs and the safe environment for them will lead to the prosperity of children in the future [1]. The average school attendance time for students is 6 hours [2]. The area, the number of elementary schools and the population of students in district 4 of Ministry of Education are 9589067 square meters, 101 schools and 63,000 students respectively. The required area is 25.2 square meters for each student. Lack of access to safe water, sanitary facilities, adequate space, adequate and standard equipment and tools, proper waste materials collection and waste management system lead to undesirable educational, research feedback among students [3]. Attention

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Deficit/Hyperactivity Disorder (ADHD) is the most common emotional, cognitive, and behavioral disorder. Mostly neglected, pre-activator-impulsive and combination type, including three types of ADHD, are considered DSM-IV criteria [4]. Sustained attention is the most important problem in a child with ADHD. Psychosocial, genetic, environmental factors, nutritive and familial disorders, low birth weight, tobacco consumption during mother's pregnancy, family history, and mental stress in pregnancy are considered as the most effective factors in the incidence of ADHD [5]. Salicylic acid-rich foods are probably the most important cause of the etiology of hyperactivity syndrome. Drug therapy with a stimulant such as Ritalin, aerobic physical activity, nutritional therapy and educational psychological interventions (including behavioral, cognitive-behavioral and educational) are considered as ADHD treatment methods [6]. A diet rich in vitamins, minerals, and unsaturated fatty acids, such as omega-3, can treat ADHD [7]. Planning Teacher Education is the most effective way to manage learning disability problems. The prevalence of ADHD is 6% in the world in year 2014 [8]. The prevalence of ADHD in boys is higher than girls and in low-income groups is more than middle income group [9]. Yejaneh Nejadand Balavandi (2017) researched about the effect of maternal parenting on behavioral problems of low-level mental ability children and found that there was a significant relationship between the variables of behavioral problems, aggression and anxiety in the level of error less than 1% with the authoritarian style of parenting [10]. Clalie (2018) studied the relationship between protective factors including mental health in the academic drop in female secondary school students and found that increase of a unit of mental health leads to a decrease of 241% in academic failure [11]. Lee et al. (2015) examined the extent to which teachers were aware of ADHD and found that teachers were an important target group for ADHD research because they play a key role in early diagnosis of ADHD [12]. Studying Attention Deficit/Hyperactivity Disorder was conducted in elementary schools in District 4 of Tehran in year 2018.

Research method

The research method is a random-interventional cluster-descriptive analytical study. The statistical community of this study is 10 primary schools in Tehran's 4th district in year 2018. The area, the number of elementary schools and the population of students in district 4 of ministry of education is 9589067 square meters, 101 schools, and 63,000 students, respectively, in the 51º 15' to 51º 33' eastern longitude and 35º 32' to 35º 49' northern altitude. 10 primary schools are located in the center, south, east, west and north of the 4th district of Tehran metropolitan. 101 major schools were identified that 10 stations (10% of units) were selected due to greater sensitivity as the overall environment of primary schools. A total of 50 pre-test/post-test inventory questionnaires with educational booklet on exercise and diet were distributed among mothers of selected elementary school students in Tehran's 4th district in year 2018 and collected after completion. The instrument was a researcher-made questionnaire that was completed in place for 40 minutes during work shift. The criteria for entering and leaving the study subjects were complete satisfaction and lack of satisfaction with answering the questionnaire questions. The questionnaire consisted of demographic variables (16 questions) and knowledge questions (3 questions and 21 items) that were completed by mothers. Demographic variables such as age, gender, student education grade, mother's education, father's education, marital status, passing a student's nutrition course, household size, monthly income, parent's job, place of residence, type of delivery, Pregnancy duration, which number of children, maximum familial risk for ADHD, maximum use of Ritalin and daily physical activity intervals for elementary school students selected in District 4 of Tehran in year 2018 were analyzed. In the knowledge questions section of the questionnaire, each question is based on a 4-point scale (very satisfactory, satisfactory, moderate and weak), and for the calculation of the score, points 4, 3, 2, and 1 are awarded to each answer. The maximum score awarded to a very satisfying answer is 84. The range of knowledge scores is divided into excellent grades (63.8-84), good (42.8-63), moderate (21.8-42) and weak (0-21) based on Likert 4-point scale. Knowledge questions includes; food table pyramid (7 questions), special food consumption for a student with ADHD (7 questions), and lack of food for a student with ADHD (7 questions). In order to precise and improve the questionnaire, in this research, pre-test participants are used in a pilot project with a volume of 10 people. In this research, for determining the scientific validity of the instrument, and for the scientific reliability, content validity and retest methods are used respectively. A total of 100 DSM-IV questionnaires were randomly distributed among elementary school students in District 4 of Tehran in year 2018 and 50 students with ADHD were selected [13]. The criteria for entering students to study were performed by the diagnosis of ADHD by a psychiatrist and having at least 6 symptoms of the test characteristics. Exit criteria were the study of motor disorders, autism, psychosis, chronic diseases and history of seizure. Running, hopping, three-stroke ball, horizontal jump and slipping are considered sports activities. Data analysis was performed using SPSS software (version 22) and ANOVA statistical model. Descriptive analysis was performed for quantitative variables using mean (μ) and standard deviation (SD). To achieve the research objectives, this test was used with a significance level of 0.05. T-test and chi-square test were used to compare and analyze variables. The quality map of elementary schools was determined by GIS mapping (Arc GIS, 10.1) [14].

Results Disscytion

Fig. 2 and Tables 1-4. show the effect of demographic variables such as age, sex, student grade, mother's education, father's education, marital status, passing a course on nutrition, household size, monthly income, parent's job, Place of living, type of delivery, duration of pregnancy, which number of children, familial history in risk of ADHD, maximum use of Ritalin and daily physical activity time of students suffered from ADHD in selected primary schools in Tehran's 4th district in year 2018. The area, the number of elementary schools and the population of students in district 4 of ministry of education is 9589067 square meters, 101 schools, and 63,000 students, respectively, in the 51º 15' to 51º 33' eastern longitude and 35º 32' to 35º 49' northern altitude (Figure 1).

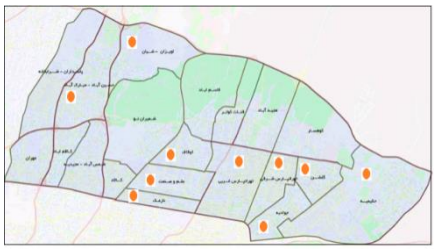

Figure (1) Map of sampling stations

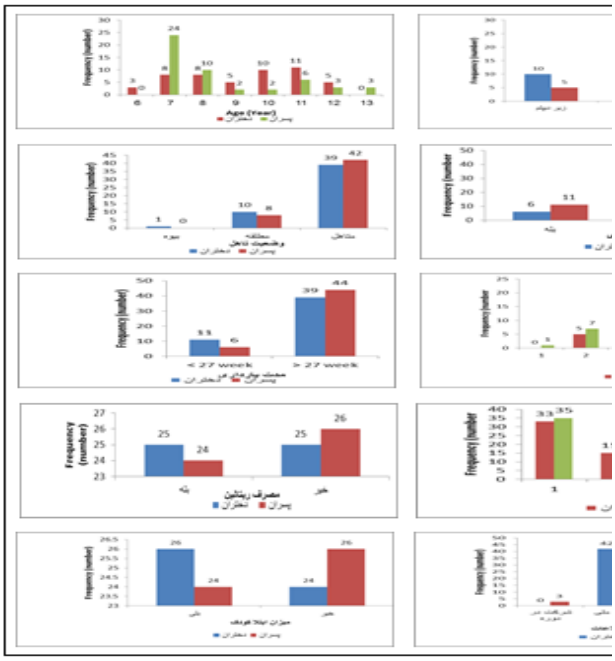

Figure (2) The students' demographical information of selected elementary schools in district 4 of Tehran in year 2018

- The results of the research in the demographic survey of 5 girlish schools indicated that the mean age was 9.28 ± 1.81 (6-12), the first grade was 24, and the second grade was 26, the incidence of ADHD was 26, the 4- people household size was 22, the first child, 33 people, cesarean, 32 people, history of disease in the family, 13 people, use of Ritalin, 25 people. The results of the research in the demographic survey of the parents of 5 girlish schools revealed that 23 mothers were bachelor degree educated, 22 fathers were bachelor degree educated, 39 were married, 6 of them had passed the course of dietary education, 25 were employees, and 39 people had a pregnancy longer than 27 weeks. The results of the research in the demographic section of the 5 boyish schools showed that the mean age was 8.54 ± 2.02 (7-13), the first grade; 37 people, and the second grade, 13 people, the prevalence of ADHD, 24 people, the 4-people family size, 20 people, the first child, 35 people, cesarean section 41 people, history of disease in the family; 6 people, use of Ritalin; 24 people. The results of the research in the demographic survey of the parents of 5 boyish schools revealed that 24 mothers were high school graduates, 22 fathers were bachelor degree educated, 39 were married, 11 had passed the course of dietary education, 24 were employees, 44 people had duration of pregnancy more than 27 weeks. According to the results of this study, it can be concluded that the prevalence of ADHD in boys is more than girls (6%) and in the first grade is more than the second grade (8%). This finding is consistent with the research carried out by Shafa'at et al in year 2013 [15]. Pre-tests have shown that increasing the level of parenting education leads to a reduction in the prevalence of ADHD disorder. The prevalence of ADHD was lower in those children whose mothers were housewife. Therefore, it can be concluded that there is a strong positive correlation between the prevalence of ADHD and maternal and parental education variables. According to the results of the study, it can be concluded that 8 weeks of aerobic running exercise leads to improve ADHD disorder. Therefore, the necessity of aerobic exercise as an effective treatment is determined. This research finding is consistent with the research carried out by Bahram et al in year 2014 [16]. In other words, the physical activity program for aerobic exercise leads to functional compatibility of children with ADHD due to controlling 95% of symptoms of anxiety and hyperactivity. This research finding is consistent with the research carried out by Verret et al in year 2012 [17]. Pre-tests showed that, aerobic exercise led to increased adaptation resulting from reduced cortisol secretion and increased serotonin reuptake in the brain. Aerobic exercise can reduce ADHD due to nerve relaxation caused by vage nerve stimulation. This finding is consistent with the research carried out by Bakhshi Pour et al. in year 2013 and Abdollahian et al. in year 2013 [18-19]. The activity of aerobic exercise leads to the reduction of ADHD due to pushing the child towards the desired social criteria (such as increased memory, self-confidence, data processing and social adjustment). This finding is consistent with the research conducted by Yazdkhasti and Shahbazi in year 2012 [20-21]. Pre-tests showed that aerobic exercise led to an increase in ADHD due to an increase in catecholamine hormone, increase in serum dopamine levels, and an increase in serotonin levels in children with ADHD. This finding is consistent with the research conducted by Kim et al. in year 2011 [22]. It can be concluded that non-hospital and non-invasive physical therapy (aerobic exercise) planning is superior to drug therapy in ADHD children. Penn et al. demonstrated that 12 weeks of table tennis sport would increase motor skills and performance in children with ADHD [23]. According

to the results of the study, it can be concluded that, 8 weeks of aerobic physical activity leads to an improvement in ADHD disorder due to anthropometric index such as BMI. Pre-tests showed that BMI increase in children with ADHD can be attributed to obesity caused by depression and a decrease in the tendency to participate in aerobic exercise activities due to decreased levels of neurotransmitter production of dopamine and serotonin. This finding is in consistent with research by Cortese et al. (2014) [24]. according to the results of the study, it can be concluded that an unhealthy diet containing food additives, refined sugar, refined grains, low protein and high-carbohydrate diets, inadequate intake of vitamins (thiamine), minerals (calcium and iron), amino acids and essential fatty acids (omega-3s and trans-fatty acids) are considered as risk factors for ADHD. Therefore, it can be concluded that the rate of ADHD follows a child's dietary pattern. Therefore, the analysis of the child's diet model leads to an analysis of the relationship between diet patterns and disease prevalence, including obesity and ADHD disorder. Pre-testings have shown that modifying the unhealthy sweet food (carbohydrates) by adding minerals (iron and calcium) leads to reduce ADHD in children. Unfavorable food patterns (industrial juices) lead to insufficient intake of vitamins and mineral and increase trans-fatty acids intake and obesity (BMI) and ADHD. Therefore, it can be concluded that there is a strong positive correlation between the incidence of ADHD and unhealthy sweet dairy variables with synthetic carbohydrates and an unhealthy, high-fat, unhealthy food pattern.

- The results of the research in the knowledge and performance of 5 girlish schools indicated that the average score of knowledge was 8.08 ± 6.98 (0-21), the most important source of national media information (42 people), the performance score was 8.23 ± 4.39 / 8 (1-21). Knowledge and practice score of physical activity was 3.4 ± 2.74 and 3.46 ± 2.01, respectively. Knowledge and practice score of food intake was 3.14 ± 2.96 and 3.8 ± 2.01, respectively. The results of the research in the Knowledge and Performance of 5 boys' schools showed that the average score of knowledge was 4.96 ± 6.91 (0-21), the most important source of national media information (43), the score of performance was 4.72 ± 4.57 (1-21), the score of knowledge and practice of physical activity were 2.82 ± 2.5 and 3.8 ± 2.01, respectively. Knowledge and practice score of food intake were 1.84 ± 2. 57 and 3.20 ± 1.88 respectively. Parents of male and female students were trained with physical exercise (running, hopping, three-stroke ball, jumping and sliding) 120 minutes (3 sessions -40 minutes) per week and a special diet booklet for a child with ADHD and achieved 100% awareness and performance. Azadbakht etal. (2012) demonstrated that the dietary approaches to stop hypertension (DASH) would play an key role in reducing inflammation, plasma levels of fibrinogen and liver aminotranferases [25].

- There was a significant correlation among performance score with marital, duration of food, household size, which number of children, type of delivery, duration of pregnancy, history of disease, consumption of Ritalin, knowledge level, ADHD variables ($P < 0.05$) (Table 4). Mortazavi and Andam (2014) demonstrated that their researcher-made questionare is a reasonable scale for evaluating women's participation motivations in recreational water sports [26].

- The results of the research in the diet section revealed that children with ADHD, used a diet containing artificial color (puffs, ice cream, ready-to-drink syrups and drinks), artificial carbohydrates (industrial drinks), preservatives, flavors, high calorie foods (high quality processed foods and processed meat) and refined grains. These children received a higher percentage of their energy in the form of carbohydrates (unhealthy sweet food patterns), processed protein (unhealthy western food patterns) and industrial juices (unhealthy ready to eat food). These children received low levels of vitamins such as thiamine, calcium and iron. The average body mass index (BMI) in children with ADHD is more than healthy children (healthy food patterns). According to Australian Bureau of Statistics (2014) diet and exercise both are necessary for controlling the weight of the body [27].

- The results of the research in the field of physical activity (running, hopping, three-stroke ball, horizontal jump and slipping) revealed that the mean of ADHD in children with ADHD in girlish and boyish students were decreased from 15.35 ± 1.56 to 7.64 ± 1.16 and 16.28 ± 1.34 to 9.31 ± 1.34 after 8 weeks. This finding is consistent with the research conducted by Piepmeier etal. in year 2012 [28].

Table 1- The parents' knowledge and practice scores mean major of selected elementary schools in district 4 of Tehran in year 2018

Parameters	Elementary schools boys				Elementary schools girls			
	Min.	Max.	μ	SD	Min.	Max.	μ	SD
Age	7	13	8.54	2.002	6	12	9.28	1.81
Household size	1	5	3.46	0.95	2	6	3.48	0.81
Monthly income	1	11.7	3.69	2.001	1	14.5	4.15	2.63
Which number of children	1	3	1.38	0.63	1	4	1.4	0.63
Food pyramid	0	7	1.82	2.50	0	7	3.4	2.74
Diet food	0	7	1.84	2.57	0	7	3.14	2.96
Forbiden food	0	7	1.3	2.34	0	7	1.54	2.37
Total knowledge score	0	21	4.96	6.91	0	21	8.08	6.98
Physical activity	3	7	5.32	1.99	3	7	5.4	1.97
Protein foods	3	7	5.08	2.01	3	7	5.16	2.01
High-grade foods	3	7	4.2	1.88	3	7	5.8	2.01
Total practice score	9	21	14.68	4.57	9	21	15.64	4.32

Table2- The frequency of parents' knowledge and practice scores of selected elementary schools in district 4 of Tehran in year 2018

Parameters		Elementary schools boys				Elementary schools girls			
		Excellent (15.9-21)	Good (10.7-15.7)	Medium (5.4-10.5)	Weak (0-5.2)	Excellent (15.9-21)	Good (10.7-15.7)	Medium (5.4-10.5)	Weak (0-5.2)
Knowledge	Pre- Test	2 (8%)	1 (4%)	7 (28%)	15 (60%)	3 (12%)	7 (28%)	5 (20%)	10 (40%)
	Post- Test	25 (100%)	0 (0%)	0 (0%)	0 (0%)	25 (100%)	0 (0%)	0 (0%)	0 (0%)
Practice	Pre- Test	10 (40%)	8 (32%)	7 (28%)	0 (0%)	14 (65%)	6 (24%)	5 (20%)	0 (0%)
	Post- Test	25 (100%)	0 (0%)	0 (0%)	0 (0%)	25 (100%)	0 (0%)	0 (0%)	0 (0%)

Table3- Mean and standard deviation of parents' knowledge and practice scores of selected elementary schools in district 4 of Tehran in year 2018

Parameters		Elementary schools boys			Elementary schools girls		
		μ±SD	Min.	Max.	μ±SD	Min.	Max.
Knowledge	Pre-Test	4.96±6.91	0	21	8/08±6/98	0	21
	Post- Test	21	21	21	21	21	21
	Paired-Test	T=21.47	Df=44	P=0.001	T=9.06	Df=30	P=0.001
Practice	Pre- Test	14.68±4.57	9	21	15.64±4.39	9	21

	Post-Test	21	21	21	21	21	21
	Paired-Test	T=25.79	Df=42	P=0.001	T=7.49	Df=27	P=0.001

Table4- Correleation between parameters

Knowledge	Parameters	Elementary schools boys			Elementary schools girls		
		$\mathbf{P}_{value}$	F	R^2	$\mathbf{P}_{value}$	F	R^2
Pre-Test	Age	0.878 (NS)	0.024	0.001	0.594 (NS)	0.288	0.006
	Education	0.836 (NS)	0.043	0.001	0.422 (NS)	0.657	0.013
	Mother's Education	0.696 (NS)	0.157	0.003	0.310 (NS)	1.055	0.021
	Father's Education	0.348 (NS)	0.899	0.018	0.853 (NS)	0.035	0.001
	Marriage	0.049 (S)	3.505	0.068	0.034 (S)	4.768	0.90
	Diet food	0.049 (S)	3.417	0.066	0.021 (S)	5.663	0.106
	Household size	0.049 (S)	3.218	0.063	0.044 (S)	2.920	0.057
	Monthly income	0.247 (NS)	1.376	0.280	0.309 (NS)	1.057	0.022
	Job	0.651 (NS)	0.207	0.004	0.269 (NS)	1.250	0.025
	Which number of children	0.050 (S)	3.718	0.072	0.001(S)	15.012	0/238
	Type of Delivery	0.049 (S)	3.371	0.065	0.005 (NS)	8.704	0/153
	Pregnancy period	0.049 (S)	3.294	0.064	0.005 (NS)	8.691	0.148
	Histoey of illness	0.001(S)	17.263	0.256	0.001 (S)	16.049	0.251
	Use of Ritalin	0.004 (S)	0.990	0.158	0.001 (S)	15.280	0.241
	Source of Data	0.551(NS)	0.360	0.007	0.916 (NS)	0.011	0.001
	Level of knowledge	0.049 (S)	3.461	0.067	0.004 (S)	9.29	0.162
	Incidence of ADHD	0.004 (S)	8.990	0.158	0.001(S)	16.756	0.259
Post-Test	Age	0.878 (NS)	0.024	0.001	0.594 (NS)	0.288	0.006
	Education	0.836 (NS)	0.043	0.001	0.422 (NS)	0.657	0.013
	Mother's Education	0.696 (NS)	0.157	0.003	0.310 (NS)	1.055	0.021
	Father's Education	0.348 (NS)	0.899	0.018	0.853 (NS)	0.035	0.001
	Marriage	0.049 (S)	3.505	0.068	0.034 (S)	4.768	0.090
	Diet food	0.049 (S)	3.417	0.066	0.021 (S)	5.663	0.106
	Household size	0.049 (S)	3.218	0.063	0.044 (S)	2.920	0.057
	Monthly income	0.247 (NS)	1.376	0.280	0.309 (NS)	1.057	0.022
	Job	0.651 (NS)	0.207	0.004	0.269 (NS)	1.250	0.025
	Which number of children	0.050 (S)	3.718	0.072	0.001 (S)	15.012	0.238
	Type of Delivery	0.049 (S)	3.371	0.065	0.005 (S)	8.704	0.153
	Pregnancy period	0.049 (S)	3.294	0.064	0.005 (S)	8.691	0.148
	Histoey of illness	0.001 (S)	17.263	0.256	0.001 (S)	16.049	0.251
	Use of Ritalin	0.004 (S)	0.990	0.158	0.001 (S)	15.280	0.241
	Source of Data	0.551 (NS)	0.360	0.007	0.916 (NS)	0.011	0.001
	Level of knowledge	0.001 (S)	17.307	0.258	0.001 (S)	16.093	0.255
	Incidence of ADHD	0.004 (S)	8.990	0.158	0.001 (S)	16.756	0.259

Table5- Mean and standard deviation of parents ADHD of selected elementary schools in district 4 of Tehran in year 2018

Parameters		Elementary schools boys	Elementary schools girls
		μ±SD	μ±SD
ADHD	Pre-Test	16.28±1.34	15.35±1.56
	Post-Test	9.31±1.34	7.64±1.16
	Paired-Test	0.001, Df=43, t=26.67	0.001, Df= 29, t= 8.27
BMI	Pre-Test	20.51±3.26	19.70±2.93
	Post-Test	16.16±1.24	15.35±1.12
	Paired-Test	0.001, Df=43, t= 26.67	0.001, Df= 29, t=8.27

Conclusion

These results confirm past findings that physical activity and healthy diet helps children with and without ADHD. Therefore, for future studies, it is suggested that the effect of other formal and targeted sports and in different age groups on other behavioral disorders in the field of sports and rehabilitation to be considered and investigated. According to the conducted research, the use of exercise as a complementary method, along with therapeutic approaches such as drug and behavioral therapy, are recommended for the improvement of children with ADHD. Regarding the results of this research, it is suggested to education administration of district 4, the planning and providing in-service teacher training and parent education about the timely identification of children and their referral for treatment prevents the problems of academic failure due to related syndrome. Some limitations of this research are the lack of proper control of subjects 'nutrition, the lack of precise control of subjects' activity outside of the study time, lack of control over the mental and emotional state of subjects, the choice of sample size and dietary diversity in Iran.

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List of Symbols

Nomenclature	
ADHD	Attention-deficit/hyperactivity disorder
DSM-IV	Diagnostic and statistical manual of mental disorders, 4th edition
GIS	Geographic information system
Max	Maximum
Min	Minimum
μ	Mean
SD	Standard deviation

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