

Investigating the relationship of attention deficit hyperactivity disorder and eating disorders in adults

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Abstract

ADHD is a neurodevelopmental disorder which starts from childhood and early juvenility and can even continue until adolescence. It is noticeable with three factors: hyperactivity, attention inability, and Impulsivity. Researches have demonstrated that the main symptoms of ADHD is also present in patients diagnosed with eating disorders. The goal of the present study is to investigate the relationship of Attention deficit hyperactivity disorder and eating disorders in adults. The present study is a correlational study with a cross sectional descriptive method. The sample contains of 150 people chosen from adults using random sampling method. All of the participants answered the Eating attitudes scale (Garner and Garfinkel, 1982) and the Adult ADHD self-report scale (world health organization, 1994). The data were analyzed using Pearson correlation coefficient and Spearman correlation coefficient. Considering the result of current study it can be said that ADHD and Eating disorders are related to one another, because based on the evidence gathered, these two variables have similar neurobiological properties and clinical features, and thus ADHD has the ability of eating disorder occurrence anticipation.

Keyword: Attention deficit hyperactivity disorder; Diet; Eating disorder; Impulsivity

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1. Introduction

Attention-deficit hyperactivity disorder is a neurodevelopmental disorder which starts from childhood and early juvenility and can even continue until adolescence. From a clinical perspective this conflict is defined as: a disorder in which there are unsuitable stages of hyperactivity, inattention, and impulsivity in terms of age, which disrupt daily educational, business and individual functioning (Faraone et al, 2006). People who fulfil diagnostic criterion of DSM-5 for ADHD, have severe hyperactive/impulse behavioural patterns. Researchers have estimated the outbreak of ADHD to be an average of 5/29% worldwide, but this number is a lot different in myriad countries and regions around the globe (Polanczyk, Lima, Horta, Biederman, Rohde, 2007).

Researchers considered ADHD as a disorder which starts from childhood and lasts till adolescence. ADHD probably does not show itself in adults for the first time, clinical researchers can only diagnose it properly until then. We can assume that clinical experts ignore adult ADHD cases or diagnose them mistakenly, especially in cases which had the symptoms of attention disability but not the ones of disturbance. Probably around 4 percent of American adults fulfil the diagnostic criterions for this disorder so that the number of men and women diagnosed with this disorder is equal (Kessler et al, 2016). They almost always suffer from one or more disorders that emerge with ADHD. Anxiety, Depression, Substance use disorder, Sleep disorder, Bipolar disorder, Personality disorder and Eating disorder, are some examples. Also, patients diagnosed with ADHD have more conflicts and problems compared to the control group. Patients suffering from ADHD are in lower social – economical states compared to other people. A systematic review of all the research done up till now, suggest the fact that compared to other eating disorders Bulimia nervosa is seen more among patients diagnosed with ADHD (Nazar et al, 2008). Also, there is more of Bulimia nervosa and Bulimia symptoms in patients suffering from ADHD compared to Anorexia (Fernandez-Aranda et al. 2013). The factor that mediates the relationship between ADHD and Eating disorder, remained unknown; but probably a combination of both genetic and environmental mechanisms plays a major role in emergence of these disorders (Davis et al. 2009).

Eating disorders separate with sustained disturbance in eating or related behaviors which leads to a change in food consumption or absorb and major injury in physical health and psycho – social functioning (American Psychiatric Association, 2013). Patients with bulimia overeat. During that activity they eat too much in a short period of time (2 hours as an example). During this period, they feel uncontrolled which cause them to feel like they cannot stop eating or they are unable to adjust the amount of food they eat. Thus, in avoiding weight gain, they commit a purge which means they attempt to take out the extra calories using methods such as intentional vomit, misusing laxatives, diuretics, and other variety of medicines, fasting or eternal exercise. In addition to these behaviors, they establish their perspective of themselves based on how much they weigh and the external form of their body. These periods may not just happen during Anorexia periods for the person to be diagnosed with bulimia. Patients with bulimia may attempt to overindulge and purge once a week. The prevalence of Bulimia through the lifespan is 1.5 percent for women and 0.5 percent for men. Researchers assume that the prevalence of Bulimia is 1.3 present in university girl students at any time (Keel et al., 2005).

Although Bulimia is centre of attention and it is more common among women, men may fall into its trap too. In an online surveying research done by an active health and prevention from diseases organization on 6500 members, researchers concluded that a major percentage of men have experienced periods of uncontrolled eating (20 percent), overeating at least once (8 percent), fasting (4 percent), using laxatives (3 percent), eternal exercise (6 percent), and body checkout (9 percent). Compared to men, women are more likely to do almost all the activities mentioned. There were no noticeable gender differences in using laxatives and doing eternal exercise in order to prevent weight gain after an overeating period. Binge eating is a new diagnostic added to DSM-5 and includes people who overeat at separated periods of time. They do not have control over their eating and overeat at

least two times a week and during a 6-month period. It is vital for the overeating to be more than enough, happen after the person reaches the limit, and happen when the person is alone to be eligible to count as bulimia; also, the overeating must come alongside with hate of self or feeling guilty after eating too much. It is probable that patients with disorder mentioned, gain noticeable amount of weight due to the lack of compensatory behaviors (Elsayed & Salama, 2020).

ADHD symptoms and disordered eating behaviors are often related to one another, and it had been discussed in scientific literature. The prevalence of eating disorders in cases with ADHD in a particular range has been reported up to 12% (Sobanski et al., 2006; Surman & Randall, 2006). In another study 9% of people who show symptoms of Bulimia report that ADHD is the cause of increased eating behavior in them (Blinder, Cumella, & Sanathara, 2006; Tukaiev et al., 2020). Research show that main ADHD symptoms (including inattention, hyperactivity, and impulsivity) are present in Eating disorders. Yates et al. (2009) have recently discovered the fact that 6 or more of ADHD symptoms are noticeably present in 27% of women patients hospitalized in specialized clinics for eating disorder treatment (Yates et al., 2009). ADHD symptoms anticipate the fact that impulsivity has a meaningful relationship with overeating and purging behavior. Researchers have also discovered that although people with Bulimia are more likely to experience ADHD, they are more impulsive compared to people who only suffer from Bulimia (Bleck & DeBate, 2013). In addition, people who experience both ADHD and Bulimia, have more disintegrated eating pattern compared to those who only suffer from Bulimia (Seitz et al. 2013).

The intermediary factor of ADHD and Eating disorders relationship remained unknown at the moment; but probably a combination of genetic and environmental mechanisms plays a major role in emergence of these two disorders. Changes made in genetic and more specifically, dopaminergic genes, cause change in rewarding process which can be demonstrated as ADHD and Eating disorder taking place at the same time in patients. Also, in a controlled case study we observe an overweight man who suffers from ADHD alongside with binge eating. And women with Bulimia had experienced ADHD in their childhood lives. Generally, it can be concluded that after genetic and environmental factors, childhood clinical records play a major role in relationship between ADHD and Eating disorders (Davis et al. 2009).

Abnormalities in mechanisms related to attention and impulsivity, can interpret the relationship between ADHD and Eating disorders, impulsive behavior counts as the main core of ADHD and the inability to control such behaviors can clearly be seen among these patients (Faraone et al. 2006; Zeenat, 2019). Also, impulsivity plays an important role in emergence of overeating - purging behaviors. Severe negative urges are another aspect of impulsivity, this fact shows that such urges are related to Bulimia, also, emotional adjustment has a significant role in controlling these urges thus, it has the same role in demonstration of this relationship (Fischer et al., 2012; Adeniyi & Kuku, 2020).

2. Method and Materials

This descriptive cross-sectional study is conducted in summer 1397 and on 150 people who were Mashhad city residents (101 women and 49 men) and on the range of 20 – 49. The sampling method of the study was random sampling. Questionnaires were distributed considering privacy. First the Adult ADHD self-report scale (ASRS) will be described. The Adults ADHD self-report scale made by the world health organization (WHO) and a group consist of a psychiatrist team and researchers of the world health organization in 1994. This scale consists of two dimensions and eighteen questions divided into two A and B sections. 9 questions are considered for inattention dimension (1-9) and 9 questions for hyperactivity/impulsivity (10 -18). There is a shortened 6 question version of the scale for quick clinging which has high reliability based on myriad research. The sensitivity of the Adults ADHD self-report scale is 87% and its validity in recognizing the symptoms of adults ADHD is 98.3% to 99.5%, the sensitivity of the cut point is 50 (Kessler et al, 2016). This scale internal validity coefficient is in the range of 0.63 to 0.72 and its Pearson correlation is estimated in range of 0.58 to 0.77 (Kessler et al. 2016). Mokhtari, Rabiei, and Salimi (1394), in a research conducted on a sample of 340 referrals

to health and counseling centres of Mashhad city, measured the validity and reliability of this scale, they determined that the reliability of the ASRS is 0.87 and its validity is 0.70.

The goal of this questionnaire is to measure the feedbacks and ill eating-related behaviors and its dimensions (diets, overeating and mental obsession, and oral inhibition). This questionnaire has 3 subscales: 1. Diet (1-10), Overeating and food obsession (11 – 15), and Oral inhibition (16-20). The Cronbach's alpha of this questionnaire is: 0.825 for diet, 0.644 for overeating and food mental obsession, and 0.567 for oral inhibition. Garner et al.'s "The Eating Attitudes Test" (1982) is used as a self-measurement tool for attitude and ill eating behaviors in a wide range. The correlation of the 26-question form and the 40-question form equals 0.98. The reliability of this questionnaire for clinical and non-clinical teams equals 0.94 based on Cronbach's alpha and all the 26 questions are noticeably correlated with total score. Also, the validity of this questionnaire is reported acceptable based on concurrent validity (Garner et al. 1982). In Iran, Noubakht and Dejkam (2000) checked the content validity of the eating attitudes test. The test retest reliability in a group of 63 female students reported 0.91 after two weeks (Noubakht and Dejkam, 2000).

3. Results

The demographic features of this study include gender, age, marital status, business status, and education. The descriptive statistics of these features is explained in the following.

Table No.1 Demographic data

Part 1. Descriptive statistics for gender variable		
Percentage	Amount	Gender
67.30	101	Female
32.70	49	Male
Part 2. Descriptive statistics for age variable		
Percentage	Amount	Range of age
64.00	96	24-20
20.70	31	29-25
8.00	12	34-30
2.70	4	39-35
2.70	4	44-40
2.00	3	45-49
Part 3. Descriptive statistics for marital status variable		
Percentage	Amount	Marital status
66.70	100	Single
32.70	49	Married
0.70	1	Divorced
0	0	Widow
Part 3. Descriptive statistics in education variable		
Percentage	Amount	Education

20.70	31	Diploma and Associated degree
72.70	109	Bachelor's degree
5.30	8	MA
1.30	2	PHD

Part 4. Descriptive statistics in Business status variable

Percentage	Amount	Business status
6.00	9	Government employee
16.00	24	Private employee
18.70	28	Self-employed

Table No.2 descriptive statistic for research variables

Kurtosis ^b	Skewness ^a	Mode	Median	Standard deviation	Average	Maximum	Minimum	Variables
(0.73) 1.85	(1.30) 6.58	0	3	5.34	4.78	21.00	0.00	Eating disorder - Diet
(6.72) 17.07	(2.60) 13.10	0	0	1.40	0.65	7.00	0.00	Eating disorder-Overeating
(1.20) 3.05	(1.23) 6.23	0	1	2.32	2.05	10.00	0.00	Eating disorder-Oral inhibition
(0.84) 2.13	(1.19) 6.03	4	6	6.58	7.49	27.00	0.00	Eating disorder-Total score
(-0.10) 0.26	(0.14) 0.68	44	44	9.52	45.27	68.00	20.00	ADHD

Fact: N= 150

a- Values in parentheses: skewness statistic, Values out of parentheses: skewness Z statistic which is the result of the statistic divided by the standard error (SE= 0.20).

b- Values in parentheses: kurtosis statistic, values out of parentheses kurtosis Z statistic which is the result of the statistic divided by the standard error (SE= 0.20)

As the results of Table 2 suggest the scores for diet were in a range of 0 to 21. The average of peoples scores was 4.78 (SD= 5.24). 50 percent of people had a score higher than 3 (Median = 3). Also, most of the people had a score of 0 (Mode = 0). The calculation of the Z statistic of skewness shows that the scores had a high positive skewness. ($Z_{skew(1.30)} = 6.58$), in other words, most of the people had a score lower than average. On the other hand, the scores show a noticeable positive kurtosis ($Z_{ku(0.73)} = 1.85$), in other words, the data is gathered in the range of ± 1 of the standard division from average more than enough.

The scores were in a range of 0 to 7 for overeating. The average of the scores were 0.65 (SD = 1.40). 50 percent of participants had a score higher than 0 (Median = 0). Also, most of the participants had a score of 0 (Mode = 0). The calculation of the Z statistic of skewness shows that the scores had a high positive skewness ($Z_{skew(2.60)} = 13.10$). In other words, most of the people had a score lower than average. On the other hand, the scores show a noticeable positive kurtosis ($Z_{ku(6.72)} = 17.07$). In other words, the data is gathered in the range of ± 1 of the standard division from average more than enough.

The scores were in a range of 0 to 10 for oral inhibition. The average of the scores were 2.02 (SD = 2.32). 50 percent of participants had a score higher than 1 (Median = 1). Also, most of the participants had a score of 0 (Mode = 0). The calculation of the Z statistic of skewness shows that the scores had a high positive skewness ($Z_{skew(1.23)} = 6.23$), in other words, most of the people had a score lower than average. On the other hand, the scores show a noticeable positive kurtosis ($Z_{ku(1.20)} = 3.05$), in other words, the data is gathered in the range of ± 1 of the standard division from average more than enough.

Also, the scores for eating disorder in total were in a range of 0 to 27. The average of the scores were 7.49 (SD = 6.58). 50 percent of participants had a score higher than 6 (Median = 6). Also, most of the participants had a score of 4 (Mode = 4). The calculation of the Z statistic of skewness shows that the scores had a high positive skewness ($Z_{skew(1.19)} = 6.03$). In other words, most of the people had a score lower than average. On the other hand, the scores had a positive kurtosis ($Z_{ku(1.20)} = 2.13$). In other words, the data is gathered in the range of ± 1 of the standard division from average more than enough. But because the kurtosis statistic is lower than 2.54, it can be overlooked considering the highness of sample size.

The scores were in a range of 20 to 68 for ADHD. The average of the scores were 45.27 (SD = 9.52). 50 percent of participants had a score higher than 44 (Median = 44). Also, most of the participants had a score of 44 (Mode = 44). The calculation of the Z statistic of skewness showed that the scores had not got a much high skewness ($Z_{skew(0.14)} = 0.68$). In other words, most of the people had a score almost equal with the average. On the other hand, the scores did not show a meaningful kurtosis ($Z_{ku(-0.10)} = -0.26$). In other words, distribution of the data did not have a meaningful deviation compared to the pattern considered for normal curve.

Overall, the results showed that the consideration of having normal deviation for Eating disorder dimension has been rejected. There are three solutions for disabling the impact of this objection in calculating this research hypothesis. The first solution is correction of the data using methods such as square rooting the scores although it had not got a convenient result considering the highness of deviation from normal distribution. The second is calculating the correlation coefficients using self – regulation. Unfortunately, due to the highness of deviation from normal distribution, this method did not work either. The third method which was used was the Spearman correlation coefficient, the nonparametric equivalent of Pearson correlation coefficient.

Table No. 3 Correlation coefficients between research variables

4		3		2		1		Variables
Spearman ρ	Pearson r^a	Spearman ρ	Pearson r^a	Spearman ρ	Pearson r^a	Spearman ρ	Pearson r^a	
						-	-	1 .Eating disorder – Diet
				-	-	**0.24	**0.28 (0.47, 0.09)	2 .Eating Disorder- Overeating
				**0.24	**0.24	0.04	0.07 (0.23, 0.10)	3 Eating Disorder-Oral inhibition
		***0.50	***0.46 (0.59 , 0.30)	***0.47	***0.53 (0.76, 0.37)	***0.81	***0.89 (0.85, 0.93)	4 .Eating disorder-Total score
***0.31	***0.34 (0.50, 0.17)	0.13	0.14 (0.30, -0.02)	***0.40	***0.39 (0.51, 0.25)	**0.21	**0.26 (0.43, 0.10)	5 .ADHD

Fact: N= 150; *:0,05> α >0.01; **: 0.01> α >0.001;***: 0.001> α

a Coefficients in parentheses, Self-generated coefficients in confidence Interval of 0.95 or 2000 of sampling

4. Discussion

The result of present study confirms the existence of a relationship between ADHD and Eating disorders. So, it can be said that this study was parallel with past studies (Sobanski et al, 2006; Bleck et al. 2014; Seitz et al. 2013; Legas & Mengistu, 2018).

Recent studies of ADHD and Eating disorders simultaneous emergence is more the focus of attention. A potential reason for increasing the amount of review of these disorders can only be the existence of similarities between these two. Also, we can say that another reason of thriving the research in this field is the impact of these two disorders on general health of society. Both disorders mentioned are increasingly epidemic. Meaning, they are related to negative consequences in physical health, illogical precipitancy in educational and business affairs, and disturbance in social and familial functioning (Bleck & Debate, 2013). In summary, the factors mentioned have a negative impact on a society's general health system and a person's daily functioning (Bleck et al. 2014).

The main factors which cause the relationship between ADHD and Eating disorders, have yet stayed unknown but among revealed factors at hand, we can mention genetics and corruption in releasing dopamine. The noradrenergic system plays a major role in attention and focus. There is a close relationship between noradrenergic and serotonergic systems so that increase in serotonin levels causes an inhibition in receiving noradrenergic signals. The dopaminergic system plays an important role in motional activities and the functioning of dopamine is adjusted by serotonin (Bogodvid et al., 2017). In addition, some of the researchers suggest the mediatory role of "Personality traits" which is a factor involved in the relationship between ADHD and Eating disorders. As an example, the obsessive and perfectionist personalities are more in danger with Eating disorders (Fischer et al., 2003). Recent research shows a meaningful relationship between ADHD and irregular and abnormal eating patterns, like eating junk food. The "Raine" study was the very first study in this field which investigated 1799 teens. In that study 115 teens had ADHD in addition to irregular eating patterns (Howard, Robinson, Smith, Ambrosini, Piek, & Oddy, 2011).

Cortese et al. (2015) suggest the fact that the impulsiveness of people with ADHD causes a disturbance in executive functions which prevents these people from achieving their main goal which is controlling eating behaviors and losing weight. The findings of some research have demonstrated that different parts of brain in people with ADHD contains corruptions. For example, the reticular system of their brains which has a role in attention and consciousness, does not work properly (Kinomura et al. 1996; Kelemen, 2018). On the other hand, investigating basal ganglia shows that injuries in this region may cause problems such as hyperactivity (Sergeant et al., 2003). Also, neuroimaging investigations show that people with ADHD has problems in cerebellum and frontal lobe which has basic planning, organizing, decision making, perception of time, inhibition, and thinking functions (Quintero et al., 2019).

Although, disturbance in executive functions plays a major role in binge eating, but the story does not end in this point. Steadman and Knouse, discovered the fact that although the impulsivity in ADHD is related to binge eating symptoms, but impulsivity alone does not mediate this relationship (Kaisari et al., 2017). Numerous research have also found that the emergence of depression symptoms is related with intensifying the binge eating symptoms in overweight adults with ADHD (Muller, Claes, Wilderjans & De Zwaan, 2014; Khalife, Kantomaa, Glover, et al. 2014). About the cause of overeating, the role of the insufficiency of neurotransmitters like serotonin can be mentioned, which participate in both appetite and mood adjustment. Also, social factors can be mentioned about overeating. For example, these patients are often depressed, and depression rate is high in their families. There's low

emotional connections and nearly high conflictions in these people's families. These patients describe their parents as reckless, careless, and neglectful (Ilik, 2019).

Based on investigations of binge eating, it can be said that people with binge eating are angrier and more impulsive and have lower mood and emotional stability compared to normal people in society. Also, suicide intention is noticeable among them. In addition, other kind of disorders such as conduct disorder, substance use (use of alcohol), and personality disorders (borderline personality) can be observed in these people. Some of the researchers bring up childhood injury they believe, people who overeat have a record of mother deprivation in the early years of childhood or they were separated from their parents (or caregivers) in early years of their lives. People with ADHD also have kinds of motivational conflicts. This is because they prefer instant and small rewards over bigger and better but longer lasting rewards (Morsink et al. 2017; Eraslan & Kukuoglu, 2019).

The most important risk factor for eating disorders is being female. But it is not found if this relationship is due to biological factors or social factors. Based on studies conducted on families and twins, Anorexia, Bulimia, and Binge eating disorder seems to be complicated genetic – related illnesses with a hereditament of 50 to 83 percent (Dalle et al., 2014). It is shown that the eating disorder patients' relatives are 10 percent more in danger of getting the same disorder compared to the relatives of normal people through their lifespan (Keel, et al. 2005). Although the researchers have discovered regions on the chromosomes 1, 3, 4, and a region on chromosome 10's short arm related to Anorexia and Bulimia, these results need further investigation (Dalle et al., 2014).

5. Conclusion

Environment plays an important role in emergence of some of the eating disorders. For example, it is shown that mothers of children who get eating disorder later, were exposed to more stressful situations during their pregnancy. Accidents during childbirth like preterm delivery, increase the probability of eating disorders. Some of the environmental factors connected to eating disorders include public harmful experiences such as being neglected or being subject of physical and sexual abuse and harmful experiences related to food and weight such as family diet, child or family obesity, critical comments of family and others about persons eating pattern or body form, and business pressure for being skinny.

Harmful experiences in western countries first make people sensitive and then encourage them to be in a diet. Such experiences mostly influence women because of the social pressure they are enduring for losing their weight. People are very vulnerable after puberty, the changes in body, stressful phenomena, and social and environmental challenges can be a cause of eating disorder in the person at this period.

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