

# Attention Deficit Hyperactivity Disorder and Eating Disorders

**Ptáček R., Kuželová H., Papežová H., Štěpánková T.**

Charles University in Prague, First Faculty of Medicine and General University Hospital, Department of Psychiatry, Prague, Czech Republic

Received June 16, 2010; Accepted August 6, 2010.

**Key words:** ADHD – Attention deficit hyperactivity disorder – Eating disorders – Binge eating – Obesity

**Abstract:** Attention deficit hyperactivity disorder (ADHD) is a common child diagnosis with frequent comorbidities (Quinn, 2008). According to present studies eating disorders may represent one of them (Mikami et al., 2008). Several studies reported ADHD relation to the higher predisposition to obesity (Altafas, 2002), higher values of signs of overnutrition, as body mass index (Waring and Lapane, 2008) or higher value of fat (Ptacek et al., 2009a, c). These characteristics are considered to be directly related to the disorder. They can be caused by impulsivity and probable specific feeding customs of ADHD patients. The presence of eating disorders in ADHD patients could partially explain previously described growth and weight changes.

**Mailing Address:** PhDr. et PhDr. Radek Ptáček, PhD., Charles University in Prague, First Faculty of Medicine and General University Hospital, Department of Psychiatry, Ke Karlovu 460/11, 128 08 Prague 2, Czech Republic; Phone: +420 224 961 111; e-mail: ptacek@neuro.cz

## Introduction

Attention deficit hyperactivity disorder (ADHD) is characterized by inappropriate inattention, impulsiveness and hyperactivity. It is one of the most commonly diagnosed childhood psychiatric disorders manifested in every part of children's behaviour (Spencer, 2008), with multiple symptomatology and heterogeneous aetiology (Waring and Lapane, 2008). According to current studies and clinical practice ADHD children are more prone to changes in growth and development (Altafas, 2002; Waring and Lapane, 2008; Ptacek et al., 2009c).

Growth and weight changes in ADHD children are usually described in connection to stimulants use, the most common medication of the disorder. However, several studies confirmed that these changes could be more typical for the disorder than for the treatment (Ptacek et al., 2009b, c). Previous predictions of possible lower tendency to obesity in ADHD children due to their increased activity were contradicted (Altafas, 2002; Curtin et al., 2005) and on the contrary it was found that children with ADHD have higher values of BMI (Altafas, 2002; Curtin et al., 2005), higher percentage of fat and other signs of overnutrition (Waring and Lapane, 2008; Ptacek et al., 2009a, b).

As the childhood obesity prevalence increases, identification of groups of children with increased overweight risk is important. However, only a few studies have been undertaken to assess the prevalence of overweight in children with other developmental disorders, such as ADHD (Curtin et al., 2005; Waring and Lapane, 2008), where obesity can demonstrate significant comorbidity (Bazar et al., 2006). For example Bell and Bhate (1992) conducted a study to examine the prevalence of obesity in children with developmental disabilities, particularly in individuals with Down syndrome and Prader-Willi syndrome who are reported to have a higher prevalence of overweight than in the general population. In their study 70% of males and 95% of females with Down's syndrome, and 49% males and 62% females from other mentally handicapped subjects, were overweight or obese, compared with 40% of males and 32% females in control group.

It was previously described that higher incidence of obesity in ADHD patients can be caused by lower self-control in eating (Altafas, 2002; Curtin et al., 2005). Similarly, according to Cortese et al. (2008) ADHD may lead to obesity due to abnormal eating behaviour or ADHD specific lifestyle. Both obesity and ADHD share similar features as impulsivity and both can represent expression of common underlying neurobiological dysfunctions (Cortese et al., 2008). Higher incidence of signs of overnutrition is supposed to be caused also by endocrinological changes.

## ADHD and comorbid eating disorders

Eating disorders (ED) represent a common and serious class of psychiatric disorders (Papežová, 2006) and include mainly anorexia nervosa (AN), bulimia nervosa (BN), eating disorders not otherwise specified (EDNOS), and binge-eating disorder (BED) (according to DSM-IV and ICD-10). Both groups of eating disorders

and ADHD embody a higher prevalence of other comorbid disorders. According to the available studies, 70% of adults with ADHD have at least one psychiatric comorbidity (Nazar et al., 2008; Quinn, 2008).

Patients with ADHD and ED (mainly types with binge-eating and purging behaviour) share common features, such as varied degrees of impulsivity, low self-esteem and a neuropsychological profile including deficits in attention and executive functions (Schoechlin and Engel, 2005; Nazar et al., 2008). Poor inhibitory control and deficits in executive functioning can lead to over-consumption and may also result in eating without hunger and binge eating (Blinder et al., 2006; Strimas et al., 2008; Pagoto et al., 2009).

The literature on eating disorders in children with ADHD is sparse. Significant gender differences could be the reason that eating pathology has not been published enough in the literature on ADHD. According to World Health Organization, males more than females tend to be overweight and obese (World Health Organization, 2006), eating disorders overwhelmingly affect females (9:1) by contrast (Mikami et al., 2008) and ADHD is a strong preponderance of males (Atlafas, 2002).

According to Altafas's (2002) almost half of obese adults met diagnostic criteria for ADHD. This is in agreement with Strimas et al. (2008) who found that ADHD symptoms are significantly associated with overeating. Also in Davis et al.'s (2009) study, the pathway between ADHD and overeating was statistically significant. Pagoto et al. (2009) suggested that binge eating disorder (BED) partially mediates the associations between ADHD and both overweight and obesity. Davis et al. (2008) found that ADHD symptoms relate positively to forms of overeating such as eating in response to negative mood, environmental cues rather than hunger, and binge eating.

Impulsivity is a characteristic which appears in both, eating disorders (Waxman, 2009) and ADHD (Steiger and Bruce, 2007; Strimas et al., 2008). High-impulsive people harder resist to food intake and that can result in affect eating, higher food intake and obesity development (Guirrieri et al., 2009). Impulsive children ingested significantly more calories than their less impulsive counterparts when faced with foods that varied in colour, form, taste, and texture, but not in the monotonous food condition (Guirrieri et al., 2008). There is also evidence that highly palatable food can be an addictive substance, and that compulsive overeating can be modelled as an addictive behaviour (Davis and Carter, 2009; Davis et al., 2009). Some cases of obesity may be the consequence of a food addiction (Cassin and von Ranson, 2007) that occurs with greater prevalence in those with ADHD (Davis and Carter, 2009). This is explained by the same brain control mechanisms for body weight and food intake (Hoebel et al., 2007).

One possibility for higher predisposition to obesity in ADHD is that the distractibility associated with ADHD may contribute to the poor meal planning with the tendency to eat what is convenient and readily available. E.g. fast foods which

could be a preferred are high in fat and sugars (Donahoo et al., 2008). ADHD patients choose for the immediate choice when faced with a choice between immediacy and delay (Banaschewski et al., 2005).

Other explanation could be that food may be used to self-medicate the hypo-dopaminergic state associated with ADHD (Davis et al., 2008).

In this relation adult women with ADHD are at higher risk of developing eating disorders, mainly bulimia nervosa (Nazar et al., 2008). ADHD was found as high as 17% among a group of 30 female eating disorder patients. In study of Biederman et al. (2007) ADHD girls were 3.6 times more likely to meet criteria for eating disorders when compared to control females. A Blinder's (2006) study of over 2,000 patients treated as inpatients for ED found rates of ADHD at 3% in those with anorexia nervosa and 9% in those with bulimia nervosa (Blinder et al., 2006). Mikami's (2008) study showed that adolescent girls with ADHD-combined type showed more eating pathology at follow-up than comparison girls. Surman et al. (2006) analyzed two paediatric and adult samples (522 children, 742 adults). Significantly higher occurrence of bulimia nervosa was found in adult ADHD women, no differences in men or children. Wentz's (2005) study of 30 ADHD women patients found prevalence as high as 17% among the group of female with eating disorder (Wentz et al., 2005). Yates' (2009) study included 189 inpatient women with an eating disorder and examined the prevalence of individual ADHD symptoms. In the study increased rate of ADHD among patients with ED was found (Yates et al., 2009). Most of the ADHD cases identified in the study occurred in those with anorexia nervosa and bulimia nervosa. Kohl et al. (2004) suggests that anorexia nervosa and hyperactivity can be a manifestation of other psychiatric disorder or hyperactivity may be a variant of anorexia nervosa, which has the same effects, as weight loss. However the statement that hyperactivity has the same effect as anorexia – weight loss is not completely correct. According to present studies ADHD children show higher values of signs of overnutrition (BMI, percentage of fat) (Waring and Lapane, 2008; Ptacek et al., 2009a, b) and can also have higher predisposition to obesity (Altafas, 2002) as it was mentioned previously.

Also genetic association studies appear which found similar associations between ADHD and eating disorders. Davis et al. (2009) consider a role of the D3 receptor in ADHD and binge eating, the role of serotonin neurotransmission genes is considered (Sulek et al., 2007; Martásková et al., 2009; Kuzelova et al., 2010) and other candidate genes common for both ADHD and binge eating are under investigation.

The understanding of eating behaviour in ADHD children is necessary for planning the treatment. According to the current studies and clinical practice medication by stimulants can cause decrease of appetite and weight loss (Poulton and Nanan, 2009). Lower percentage of fat (Ptacek et al., 2009a, b), decreased weight (Spencer et al., 2006; Spencer, 2008) and lower values of height (Poulton and Nanan, 2009) were found in medicated children with ADHD. Therefore stimulant therapy for

ADHD may be contraindicated in some low-weight patients with anorexia nervosa (Yates et al., 2009). However the decrease of appetite and weight loss during the medication by stimulants can be caused just by the moderation of the symptoms of ADHD and maybe also impulsivity in feeding behaviour. Furthermore these connections have to be confirmed.

### **Discussion and Conclusion**

Attention deficit hyperactivity disorder is a common diagnosis which may be related to changes in somatic development. Children with ADHD are more prone to changes in growth and signs of overnutrition – higher values of body mass index and percentage of fat were documented in several studies (Ptacek et al., 2009a, b) and recent evidence suggests an association between obesity and ADHD (Waring and Lapane, 2008). Previous predictions of possible lower tendency to obesity in ADHD children thanks to supposed increased activity and active living were contradicted.

The question why ADHD patients have higher predisposition to obesity remains unclear. It can be partly explained by specific feeding customs (i.e. chaotic eating pattern) and behaviour and possible higher caloric intake. However these predictions have not been definitely confirmed yet.

Several comorbidities may occur in ADHD patients including eating disorders. According to recent studies, ADHD is probably connected with specific changes in eating customs. These findings could explain changes in body constitution and higher values of signs of nutrition in ADHD children. Impulsivity in ADHD patients can lead to higher food intake and take food as an addictive substance. The distractibility associated with ADHD may also contribute to poor meal planning with the tendency to eat what is readily available.

Causal relations between eating disorders and personality disorders remain unclear. Nevertheless association between eating disorders and ADHD could have important clinical and therapeutic implications. The presence of eating disorders in ADHD patients could explain growth and weight changes which were previously described.

There are several possibilities for higher occurrence of eating disorders (pathological or aberrant eating or aberrant nourishment) in ADHD patients. The first is that ADHD and eating disorders share common neurobiological bases, the second, psychopathological factors common to both eating disorders and ADHD mediate the association. Other possibilities are that inattention and impulsivity can foster eating disorders (aberrant nourishment) or eating disorders contribute to ADHD (Cortese et al., 2007). Every mentioned reason is possible.

Eating disorders present comorbidity for ADHD, however very reduced number of studies available, heterogeneous methodology and small sample sizes limit the generalization of the findings. Deeper explanation of these associations can help understanding of both disorders and can be very clinically and therapeutic important.

## References

- Altafas, J. R. (2002) Prevalence of attention deficit/hyperactivity disorder among adults in obesity treatment. *BMC Psychiatry* **2**, 9.
- Banaschewski, T., Hollis, C., Oosterlaan, J., Roeyers, H., Rubia, K., Willcutt, E. (2005) Towards an understanding of unique and shared pathways in the psychopathophysiology of ADHD. *Dev. Sci.* **8**, 132–140.
- Bazar, K. A., Yun, A. J., Lee, P. Y., Daniel, S. M., Doux, J. D. (2006) Obesity and ADHD may represent different manifestations of a common environmental oversampling syndrome: a model for revealing mechanistic overlap among cognitive, metabolic, and inflammatory disorders. *Med. Hypotheses* **66(2)**, 263–269.
- Bell, A. J., Bhate, M. S. (1992) Prevalence of overweight and obesity in Down syndrome and other mentally handicapped adults living in the community. *J. Intellectual. Disabil. Res.* **36**, 359–364.
- Biederman, J., Ball, S. W., Monuteaux, M. C., Surman, C. B., Johnson, J. L., Zeitlin, S. (2007) Are girls with ADHD at risk for eating disorders? Results from a controlled, five-year prospective study. *J. Dev. Behav. Pediatr.* **28(4)**, 302–307.
- Blinder, B. J., Cumella, E. J., Sanathara, V. A. (2006) Psychiatric comorbidities of female inpatients with eating disorders. *Psychosom. Med.* **68**, 454–462.
- Cassin, S. E., von Ranson, K. M. (2007) Is binge eating experienced as an addiction? *Appetite* **49**, 687–690.
- Cortese, S., Bernardina, B. D., Mouren, M. C. (2007) Attention-deficit/hyperactivity disorder (ADHD) and binge eating. *Nutr. Rev.* **65(9)**, 404–411.
- Cortese, S., Angriman, M., Maffei, C., Isnard, P., Konofal, E., Lecendreau, M., Purper-Ouakil, D., Vincenzi, B., Bernardina, B. D., Mouren, M. C. (2008) Attention deficit/hyperactivity disorder (ADHD) and obesity: a systematic review of the literature. *Crit. Rev. Food Sci. Nutr.* **48(6)**, 524–537.
- Curtin, C., Bandini, L. G., Perrin, E. C., Tybor, D. J., Must, A. (2005) Prevalence of overweight in children and adolescents with attention deficit hyperactivity disorder and autism spectrum disorders: a chart review. *BMC Pediatr.* **5**, 48.
- Davis, C., Carter, J. C. (2009) Compulsive overeating as an addiction disorder. A review of theory and evidence. *Appetite* **53(1)**, 1–8.
- Davis, C., Levitan, R. D., Kaplan, A. S., Carter, J., Reid, C., Curtis, C., Patte, K., Hwang, R., Kennedy, J. L. (2008) Reward sensitivity and the D2 dopamine receptor gene: a case-control study of binge eating disorder. *Prog. Neuropsychopharmacol. Biol. Psychiatry* **32(3)**, 620–628.
- Davis, C., Patte, K., Levitan, R. D., Carter, J., Kaplan, A. S., Zai, C., Reid, C., Curtis, C., Kennedy, J. L. (2009) A psycho-genetic study of associations between the symptoms of binge eating disorder and those of attention deficit (hyperactivity) disorder. *J. Psychiatr. Res.* **43(7)**, 687–696.
- Donahoo, W., Wyatt, H. R., Kriehn, J., Stuhrt, J., Dong, F., Hosokawa, P., Grunwald, G. K., Johnson, S. L., Peters, J. C., Hill, J. O. (2008) Dietary fat increases energy intake across the range of typical consumption in the United States. *Obesity (Silver Spring)* **16(1)**, 64–69.
- Guerrieri, R., Nederkoorn, C., Jansen, A. (2008) The interaction between impulsivity and a varied food environment: its influence on food intake and overweight. *Int. J. Obes.* **32(4)**, 708–714.
- Guerrieri, R., Nederkoorn, C., Schrooten, M., Martijn, C., Jansen, A. (2009) Inducing impulsivity leads high and low restrained eaters into overeating, whereas current dieters stick to their diet. *Appetite* **53(1)**, 93–100.
- Hoebel, B. G., Avena, N. M., Rada, P. (2007) Accumbens dopamine-acetylcholine balance in approach and avoidance. *Curr. Opin. Pharmacol.* **7(6)**, 617–627.
- Kohl, M., Foulon, C., Guelfi, J. D. (2004) Hyperactivity and anorexia nervosa: behavioural and biological perspective. *Encephale* **30(5)**, 492–499. (in French)
- Kuzelova, H., Ptacek, R., Macek, M. (2010) The serotonin transporter gene (5-HTT) variant and psychiatric disorders: review of current literature. *Neuro Endocrinol. Lett.* **31(1)**, 4–10.

- Martásková, D., Šlachťová, L., Kemlink, D., Záhorská, D., Papežová, H. (2009) Polymorphisms in serotonin-related genes in anorexia nervosa. The first study in Czech population and metaanalyses with previously performed studies. *Folia Biol. (Praha)* **55(5)**, 192–197.
- Mikami, A. Y., Hinshaw, S. P., Patterson, K. A., Lee, J. C. (2008) Eating pathology among adolescent girls with attention-deficit/hyperactivity disorder. *J. Abnorm. Psychol.* **117(1)**, 225–235.
- Nazar, B. P., Pinna, C. M., Coutinho, G., Segenreich, D., Duchesne, M., Appolinario, J. C., Mattos, P. (2008) Review of literature of attention-deficit/hyperactivity disorder with comorbid eating disorders. *Rev. Bras. Psiquiatr.* **30(4)**, 384–389.
- Pagoto, S. L., Curtin, C., Lemon, S. C., Bandini, L. G., Schneider, K. L., Bodenlos, J. S., Ma Y. (2009) Association between adult attention deficit/hyperactivity disorder and obesity in the US population. *Obesity (Silver Spring)* **17(3)**, 539–544.
- Papežová, H. (2006) New questions and their solution in eating disorders. *Cas. Lek. Cesk.* **145(3)**, 181–183. (in Czech)
- Poulton, A., Nanan, R. (2009) Stimulant medications and growth. *J. Am. Acad. Child Adolesc. Psychiatry* **48(5)**, 574–576.
- Ptacek, R., Kuzelova, H., Paclt, I., Zukov, I., Fischer, S. (2009a) Somatic and endocrinological changes in non-medicated ADHD children. *Prague Med. Rep.* **110(1)**, 25–34.
- Ptacek, R., Kuzelova, H., Paclt, I., Zukov, I., Fischer, S. (2009b) Anthropometric changes in non-medicated ADHD boys. *Neuro Endocrinol. Lett.* **30(3)**, 377–381.
- Ptacek, R., Kuzelova, H., Paclt, I., Zukov, I., Fischer, S. (2009c) ADHD and growth: anthropometric changes in medicated and non-medicated ADHD boys. *Med. Sci. Monit.* **15(12)**, 595–599.
- Quinn, P. O. (2008) Attention-deficit/hyperactivity disorder and its comorbidities in women and girls: an evolving picture. *Curr. Psychiatry Rep.* **10(5)**, 419–423.
- Schoechlin, C., Engel, R. R. (2005) Neuropsychological performance in adult attention-deficit hyperactivity disorder: Meta-analysis of empirical data. *Arch. Clin. Neuropsychol.* **20(6)**, 727–744.
- Spencer, T. J. (2008) Neurobiology and genetics of ADHD in adults. *CNS Spectr.* **13(9)**, 5–7.
- Spencer, T. J., Faraone, S. V., Biederman, J., Lerner, M., Cooper, K. M., Zimmerman, B., Concerta Study Group (2006) Does prolonged therapy with a long-acting stimulant suppress growth in children with ADHD? *J. Am. Acad. Child Adolesc. Psychiatry* **45(5)**, 527–537.
- Steiger, H., Bruce, K. R. (2007) Phenotypes, endophenotypes, and genotypes in bulimia spectrum eating disorders. *Can. J. Psychiatry* **52(4)**, 209–211.
- Strimas, R., Davis, C., Patte, K., Curtis, C., Reid, C., McCool, C. (2008) Symptoms of attention-deficit/hyperactivity disorder, overeating, and body mass index in men. *Eat. Behav.* **9(4)**, 516–518.
- Sulek, S., Lacinová, Z., Dolinková, M., Haluzík, M. (2007) Genetic polymorphisms as a risk factor for anorexia nervosa. *Prague Med. Rep.* **108(3)**, 215–225.
- Surman, C. B., Randall, E. T., Biederman, J. (2006) Association between attention-deficit/hyperactivity disorder and bulimia nervosa: analysis of 4 case-control studies. *J. Clin. Psychiatry* **67(3)**, 351–354.
- Waring, M. E., Lapane, K. L. (2008) Overweight in children and adolescents in relation to attention-deficit/hyperactivity disorder: results from a national sample. *Pediatrics* **122(1)**, 1–6.
- Waxman, S. E. (2009) A systematic review of impulsivity in eating disorders. *Eur. Eat. Disord. Rev.* **17(6)**, 408–425.
- Wentz, E., Lacey, J. H., Waller, G., Rastam, M., Turk, J., Gillberg, C. (2005) Childhood onset neuropsychiatric disorders in adult eating disorder patients. A pilot study. *Eur. Child Adolesc. Psychiatry* **14(8)**, 431–437.
- World Health Organization (2006) Global Database on Body Mass Index. Retrieved March 20, 2008; from: [www.who.int/bmi/index.jsp](http://www.who.int/bmi/index.jsp)
- Yates, W. R., Lund, B. C., Johnson, C., Mitchell, J., McKee, P. (2009) Attention-deficit hyperactivity symptoms and disorder in eating disorder inpatients. *Int. J. Eat. Disord.* **42(4)**, 375–378.