



AFTER-EFFECTS OF HYPERKINETIC DISORDER (HKD) IN PROSPECTIVE LONGITUDINAL (12 YEARS) STUDY

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Abstract

Purpose: Despite the significant increase in the understanding of the hyperkinetic disorder (HKD), our knowledge of the factors associated with the persistence of the disorder and further development of psychopathology is insufficient. The long-term prospective studies have aimed at identifying factors that may determine the adverse course of HKD.

Methods: The study group 54 patients (95.1% male) with HKD (mean age 8.1, SD \pm 1.7 years at the baseline assessment) was covered by a 12-year observation (mean age of participants: 19.1 \pm 1.7 years at the end of the study). Subjects were comprehensively assessed with structured diagnostic interviews and assessments of cognitive functions, including the school and family functioning, the treatment as well as internalizing and externalizing problems.

Results: Statistical analysis of the severity of HKD indicated significant reduction in the symptoms after 12 years. The birth complications (OR = 11.187; p = 0.045), chronic conflicts in family (OR = 0.129; p = 0.018) and depression of mother (OR = 6.033; p = 0.045) have proved to be significant risk factors for externalizing disorders in the study group. The single-parent family (OR = 0.099; p = 0.009) and coexistence of mothers' anxiety disorders (OR = 0.318; p = 0.043) were a significant predictors for the model of internalizing disorders. Only 28 (51.9%) of children used regular systematic therapy. Lack of the systematic treatment was a significant risk factor of transition of HKD to antisocial phenotypes (univariate regression model: R = 0.56; SE = 0.12; p < 0.001).

Conclusions: Long-term clinical observation showed that the appropriate systematic treatment until adulthood may significantly reduce undesirable behaviours. Completion of the treatment programme should be monitored systematically for many years, which greatly influences the results of school education and increases the chances for correct psychosocial development. Parents' mental disorders/conflicts considerably decrease in the treatment effects, thereby increasing the risk of social maladjustment in patients with HKD.

Key words: hyperkinetic disorder, antisocial phenotype, development, risk factors, longitudinal observation.

PURPOSE

The phenotype including three domains, i.e. impulsivity, hyperactivity and inattention, is classified according to ICD-10 [1] as hyperkinetic disorder (HKD), which is referred to as a subset of attention deficit hyperactivity disorder (ADHD) by DSM-IV [2] and DSM-V [3]. Due to the rigorous criteria, prevalence of HKD is estimated to be approximately 1-2% in school-age population [4]. Hyperkinetic disorder is a chronic neurodevelopmental disorder which hampers the child's developmental and adaptation processes and causes educational failures. Furthermore, it predisposes children to other psychopathological and social dysfunctions. Despite extensive research, the causative treatment continues to be unknown. Symptoms of inattention and impulsivity persist in adolescence and adult-

hood in a significant proportion of patients [5, 6]. They constitute a high risk of the occurrence of behavioural disturbances, delinquencies, psychoactive substances abuse, lack of education, unemployment, minor offences and traffic accidents [7-11].

So far, research has focused mainly on the course of attention-deficit hyperactivity disorder. The persisting repetitive patterns of antisocial behaviours meeting the criteria for conduct disorder in ICD-10 or DSM-IV/V are also the adverse consequence of ADHD [7, 9, 12, 13]. On the other hand, high incidence of affective disorders and anxiety disorders was found in adolescent and adult patients with ADHD diagnosed in childhood [14-17]. The phenotype of HKD in childhood seems important for both internalizing and externalizing disorders in adults. Internalizing disorders consist, according to

the DSM-V Task Force (premature scientifically to propose alternative definitions for most disorders) of anxiety and depressed mood, however, the externalizing group is characterized by antisocial behaviours, conduct disturbances, addictions and impulse-control disorders [3].

Risk factors responsible for transition from HKD to so diverse disorders are still unclear. Therefore, the aim of this study was to evaluate the associations between HKD in childhood and psychopathology of young adults in prospective study. The author hypothesized that the longitudinal observation of the same group of children with homogeneous phenotype may allow to identify the determinants of adverse course of HKD.

METHODS

Participants and procedure

The research was carried out between 2002 and 2014. The study included 54 children with HKD symptoms (95.1% male); mean age of this group at the moment the study was launched was 8.1 years ($SD \pm 1.7$). The consequences of hyperkinetic disorder were assessed more or less after 12 years of observation, when the care at the Psychiatric Outpatient Department was over (mean age of participants: 19.1 years; $SD \pm 1.7$). Research report prepared at this point of the study for each child included data on the family structure, parents' education, conflicts, mental illness and substance abuse in the family as well as pregnancy, gestational age at birth (weeks), birth complications, weight at birth, Apgar score, coherence and consistency in the child care. The diagnosis of HDK, which was performed according to the criteria of ICD-10 [1], requires the symptoms of three domains (at least 6 of 9 items of inattention; at least 3 of 5 items of hyperactive and at least 1 of 4 of impulsivity). Severity of the disorder was measured by using the Polish version (authorized translation) of NICHQ Vanderbilt Assessment Scale for Parent (VADPRS) and for Teacher (VADTRS) [18]. In the study group, these symptoms were shown before the child reached 6 years of age. The symptoms were manifested in many situations and they continued on regular basis for more than 6 months, significantly impairing the child's school and social functioning. Exclusion criteria of the study group were other psychiatric or neurodevelopmental disorders, epilepsy, mental retardation, brain injury, such as head trauma with loss of consciousness, or chronic somatic diseases. All participants in the study were administered the Wechsler Intelligence Scale for Children – Revised (WISC-R, Polish adaptation) [19]. Each child with HKD underwent an individual therapy at an outpatient department. During periodic visits (every month), the following methods were applied: psychoeducation and training of parents, behavioural-cognitive training with a reward system for

children and educational procedures addressed to teachers. Medication treatment was used only in aggravation of symptoms, because there are no strict recommendations on the choice of drugs for hyperkinetic disorder. Assuming that the structure and coherence are the most optimal factors in the case of HKD, the parents' consistency with the course of the treatment was evaluated. Patients were assessed for current HKD status and psychiatric disorder (externalizing and internalizing) at the follow-up assessment.

Statistical analysis

All statistical analyses were performed using the Statistica 10.0 PL (StatSoft), PASW Statistics 17.0 (Predictive Solutions) and Statu 12.1. The relationship between qualitative features was checked by the χ^2 test of independence and the Fisher's exact test. Since many variables were not normally distributed according to the Kolmogorow-Smirnow test with Lillefors' correction and the Shapiro-Wilk test, the analysis used non-parametric tests: the Kruskal-Wallis test with post-hoc test and the Wilcoxon signed rank test and Spearman's rank correlation. The values of the variables are presented as mean \pm SD or median, first and third quartile. The regression analysis was performed. The univariate and multivariate linear regression models were created. The p -value at the level of 0.05 was considered statistically significant.

The study was approved by the Ethics Committee of the Medical University of Białystok, in accordance with the principles of the Guidelines for Good Clinical Practice.

RESULTS

Statistical analysis of the distribution of values obtained in ICD-10, where median (middle value) in the examined in preliminary study amounted to 15 scores (at dispersion from 10 to 18) and after 12 years – 8 scores (at dispersion from 5 to 11), indicated significant differences in decreasing in the characteristic symptoms for HKD in childhood ($Z = 5.58, p < 0.001$) (Figure 1).

At the moment of completing the psychiatric outpatient care, in 19.1-year-old patients a high percentage of externalizing disorders (conduct disorders, nicotine use) (37%) along with internalizing disorders (anxiety and depressive symptoms) (35.2%) was found. The comparative analysis of the study groups is presented in Table 1. The duration of breastfeeding of children with HKD (mean = 5.3; SD 6.0 months) in the internalizing group (mean = 5.8; SD 6.8) was significantly longer as compared with the externalizing group (mean = 3.6; SD 5.3 months). Single-parent families (47.4%) were more frequent in patients with internalizing disorders. Parents of the study group with externalizing disorders were less educated (30.0%

Table 1. Comparative analysis of the study groups

Data	ID (n = 19)	ED (n = 20)	HKD without ID/ED (n = 15)	p
Gestational age at birth (week)	37.6 (SD 2.197)	37.9 (SD 1.69)	37.8 (SD 3.18)	
Pathology of pregnancy	10.5%	14.3%	26.7%	
Birth complications	15.8%	21.4%	6.7%	
Weight at birth (g)	3144.2 ± 611.4	3092.8 ± 461.4	3133.5 ± 710.8	
Apgar score	8.5 (SD 2.7)	9.2 (SD 1.3)	9.3 (SD 1.3)	
Duration of breastfeeding (month)	5.8 (SD 6.8)*	3.6 (SD 5.3)*	4.1 (SD 2.6)*	0.005
Total IQ	94.1 (SD 14.4)	100.3 (SD 11.9)	99.4 (SD 9.2)	
Repetition of class	10.5%	55.0%	28.6%	
Systematic therapy	47.4%	15.0%	78.6%	
Family				
With both parents	52.6%	65.0%	78.6%	
Single parent	47.4%	35.0%	21.4%	
Disclosed chronic conflicts	21.1%* ^a	85.0%* ^a	33.3%* ^a	0.04
Inconsistency	52.6%	85.0%* ^a	20.0%* ^a	0.002
Mother's education				
Higher	10.5%	20.0%	21.4%	
Secondary	47.4%	15.0%	42.9%	
Vocational	26.3%	35.0%	14.3%	
Elementary	15.8%	30.0%	21.4%	
Father's education				
Higher	5.3%	15.0%	21.4%	
Secondary	31.6%	10.0%	28.6%	
Vocational	26.3%	40.0%	28.6%	
Elementary	15.8%	35.0%	21.4%	
Mother's mental disorders				
Depression	5.3%	20.0%	–	
Anxiety disorders	21.1%	5.0%	–	
Nicotine dependence	10.5%	35.0%	14.3%	
Alcoholism	5.3%	15.0%	–	
Schizophrenia	–	–	7.1%	
Father's mental disorders				
Depression	5.3%	10.0%	7.1%	
Nicotine dependence	5.3%	35.0%	7.1%	
Alcoholism	15.8%	65.0%	28.6%	

ID – internalizing disorders, ED – externalizing disorders, HKD without ID/ED – hyperkinetic disorder without internalizing disorders and internalizing disorders

*Significant difference between groups p (Mann-Whitney U-test) < 0.05

**Significant difference between groups p (χ^2) < 0.05

Table 2. The predictors of internalizing disorders in study group with hyperkinetic disorder

Internalizing disorders	OR	p-value*	95% CI
Single-parent	0.099	0.009	0.0176-0.562
Maternal anxiety disorders	0.318	0.043	0.0334-0.999

*Statistically significant predictors in logistic regression model

Table 3. The predictors of externalizing disorders in study group with hyperkinetic disorder

Externalizing disorders	OR	p-value*	95% CI
Birth complications	11.187	0.045	1.060-118.004
Chronic conflicts	0.129	0.018	0.024-0.706
Mother's depression	6.033	0.045	1.044-34.843

*Statistically significant predictors in logistic regression model

ment still remains unclear, it is possible that the some cognitive or behavioural dysfunction may be the result of the short duration of breastfeeding [30]. Other longitudinal studies have confirmed that interactions between biological vulnerability and poor parenting are important in predicting further externalising problems [5, 31-33]. Children with HKD may be at risk of becoming a group of emotional deprivation, particularly if parents experience mental disorders [31, 33]. Parents present the relations with their children as stressful and giving no satisfaction. Child's disorganized activities usually evoke negative reactions of caregivers. Long-lasting lack of positive responses from the family may reinforce the child's dysfunctional behaviours and problems with social adjustment. Research finds that family functioning may be an important determinant of course of HKD. When behavioural or psychological difficulties appear, parents need to understand this problem, the meaning of specific

symptoms and their causes as well as the treatment effects and consequences. The therapeutic interventions comprise also of supporting carers' skills and teaching them the strategies of taking care of a child, which change as the child development.

CONCLUSIONS

1. Long-term clinical observation showed that the HKD is a chronic disease, and appropriate systematic treatment until adulthood may significantly reduce undesirable behaviours.
2. Completion of the treatment programs should be monitored systematically for many years, which greatly influences the results of school education and increases the chances for correct psychosocial development.
3. Parents' mental disorders/conflicts considerably reduce the treatment effects, thereby.

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Conflict of interest

Absent.

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