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Original article

A clinical study of attention-deficit/hyperactivity disorder in preschool children—prevalence and differential diagnoses

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Abstract

Objective: We aimed to examine (1) the prevalence and characteristics of ADHD in preschool children, and (2) differential diagnoses among children who display symptoms of inattention and hyperactivity–impulsivity in early childhood. *Methods:* The participants were children living in Kanie-cho, in Japan's Aichi Prefecture, who underwent their age 5 exams at the municipal health center between April 2009 and March 2011. We first extracted children who were observed to be inattentive or hyperactive–impulsive during their age 5 exams and considered as possibly having ADHD. We conducted follow-ups with these children using post-examination consultations, visits to preschools, and group rehabilitation. The results of the age 5 exams were combined with behavior observations and interview content obtained during subsequent follow-ups. A child psychiatrist and several clinical psychologists discussed these cases and made a diagnosis in accordance with the DSM-IV-TR. *Results:* 91 (15.6%) of the 583 children selected were considered as possibly having ADHD; we were able to conduct follow-ups with 83 of the 91 children. Follow-up results showed that 34 children (5.8% of all participants) remained eligible for a diagnosis of ADHD. Diagnoses for the remaining children included: pervasive developmental disorders (six children, or 6.6% of suspected ADHD children), intellectual comprehension problems (four children, or 4.4%), anxiety disorders (seven children, or 7.7%), problems related to abuse or neglect (four children, or 4.4%), a suspended diagnosis for one child (1.1%), and unclear diagnoses for 29 children (31.9%). *Conclusions:* ADHD tendencies in preschool children vary with changing situations and development, and the present study provides prevalence estimates that should prove useful in establishing a diagnostic baseline.

Keywords: Attention-deficit/hyperactivity disorder (ADHD); Preschool children; Prevalence; Differential diagnoses

1. Introduction

Attention-deficit/hyperactivity disorder (ADHD) is chiefly characterized by attention deficits, hyperactivity, and impulsivity. The condition causes behavior problems and difficulties in relationships, and may lead to poor adaptation to group activities [1]. Moreover, due to impulsivity and underdeveloped behavior control, ADHD complicates child-rearing; this results in high levels of stress for guardians, and may significantly raise the risk of maltreatment [2,3]. After entering elementary school, maladaptation is marked by difficulty in sitting still, learning difficulties, and problems with group activities; this is when those around the child begin to notice

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problems. Continued maladaptation results in psychological issues, which may make adaptation more difficult still. Therefore, in addition to early detection, young children with ADHD require understanding and support from those around them.

In Japan, municipalities conduct health examinations for young children in order to detect developmental disorders at an early stage. These examinations, conducted at health centers all across Japan, are generally conducted at four months, 18 months, and three years. The objectives of these examinations are the detection of, and support for, child developmental problems, as well as child-rearing support for guardians of children with such problems. More than 90% of children in Japan undergo these assessments, which play a large role in the early detection of developmental disorders. In order to screen for developmental disorders, hyperactivity figures as a test item; however, hyperactivity–impulsivity and attention/concentration difficulties are nonspecific symptoms in developing preschool children. Therefore, in order to determine which children truly require support, and to provide it in the appropriate way, we must elucidate the actual presentation of ADHD in preschool children.

Studies in other countries have estimated the prevalence of ADHD in preschool children to be 1.9–5.7%, with no major difference in prevalence during elementary school [4–9]; research also suggests that early childhood symptoms remain after entering elementary school [10–12]. On the other hand, early childhood cases may possess distinctive characteristics. For example, there are several predominantly hyperactive–impulsive type cases, while there are few predominantly inattentive type cases [9]. However, there is a dearth of Japanese studies on early childhood ADHD; this is troublesome, because ADHD prevalence may be affected by culture, resulting in differences among countries and regions [9,13,14]. We, therefore, believe that understanding the current status of ADHD in Japan is crucial.

Thus, using follow-ups from age 5 municipal health examinations, we examined (1) the prevalence and characteristics of ADHD in preschool children, as well as (2) differential diagnoses among children who display symptoms of inattention and hyperactivity–impulsivity in early childhood.

2. Participants and methods

2.1. Participants

Participants were children living in Kanie-cho, Japan' Aichi Prefecture, who had turned 5 years old and underwent their age 5 exams at the municipal health center between April 2009 and March 2011. When notices were mailed regarding these exams, parents also received the enclosed written explanation of the study. This explanation requested consent to use the results of the exam, as well as those of the follow-up, for our research. All children for whom consent was obtained were used as subjects. This study was conducted with the approval of the Nagoya University School of Medicine Institutional Review Board (consent #624).

2.2. Methods

First, we extracted children whom we observed to be inattentive or hyperactive–impulsive during their age 5 exams, suggesting the possibility of ADHD. We then conducted follow-ups with these children using post-examination consultations, visits to kindergartens and nursery schools (hereafter collectively referred to as "preschools"), and group rehabilitation sessions.

2.2.1. Assessments of age 5 exams

In order to find out the possibility of ADHD in the age 5 exams, the assessment was carried out with the following information:

(a) The child's guardian answered behavior-related questions in an interview sheet (e.g., "The child is: restless, able to wait for a turn, able to act together when going outside or shopping, able to move to next activity soon even when playtime or television is interrupted," etc.).
(b) The kindergarten teacher answered behavior-related questions in an interview sheet (e.g., "The child is able to listen while sitting down on a chair, able to concentrate and engage on a problem, able to move to the next activity smoothly even when playing," etc.).
(c) A physician or psychologist carried out behavior observations during a group activity that we set up for approximately 30 min (observation points: whether the child was able to hold his/her attention, fell for stimuli, was able to listen while sitting, understood activity rules, etc.).
(d) A public health nurse interviewed the child's guardian.
(e) Individually conducted developmental tests (test items consisted of numerical concepts, understanding words and expressions, and drawing figures).
(f) Individually conducted motor examinations. (The examination evaluated upper and lower limb motor functions; the items required children to both stand and jump on one leg, and tap their fingers.)
(g) A physician or psychologist carried out behavior observations during the developmental and motor examinations (observation points: whether the child was able to perform the task while staying calm, able to obey instruction, or able to keep his/her attention).