# Attention Deficit-hyperactivity Disorder (ADHD) in Preschool

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Abstract: Attention Deficit-Hyperactivity Disorder is now known as a lifetime developmental disorder. The symptoms vary, depending on the age of the affected children. Preschool age children with symptoms of Attention Deficit-Hyperactivity Disorder (ADHD) are at risk from rejection by their peers and expulsion from the school setting due to disruptive and noncompliance behavior. Removal from preschool will limit a child's exposure to preacademic instruction and socialization. Despite the diagnosing difficulties, it has been estimated that 2% of the preschool age children suffer from ADHD. Knowledge about ADHD is a necessity for both parents and teachers in instruction for them to be able to deal with preschool age children with ADHD symptoms. Without early intervention, the symptom will remain and often escalate at the school-age. The early interventions include medications, parent-training, behavior-management interventions, and combination interventions.

## 1 INTRODUCTION

Attention Deficit-Hyperactivity Disorder (ADHD) is the most commonly diagnosed neurobiological disorder of children and three symptoms: inattention (short attention span), hyperactivity, and impulsivity. The latest data show that 3-5% of preschool and school age children are diagnosed with ADHD (McGoey et al., 2002). It is acknowledged that ADHD is a developmental disorder that tends to persist a lifetime. ADHD is frequently noticed at the age range of 2-4 (Connor, 2002), causing significant problems for children, teachers and caregivers (McGoey et al., 2002). These problems may include accidents, rejection by peers and relatives, high dependence on others, school expulsion, and so on. Generally, ADHD preschool children are also associated with physical and mental comorbidity. Some longitudinal studies reveal that ADHD symptoms in preschool children will continue into school age and can lead to more severe problems. The increasing use of drugs by ADHD preschool age children (2-4) in the United States, tripling from 1990, can be construed as an increased prevalence of ADHD preschool children in the population (Connor, 2002). Posner et al. reported that approximately 70% of preschool age children were diagnosed with comorbidities including behavioral disorders by 52.1%, communication disorders by 24.7%, and anxiety by 17.7% (Schmidt and Petermann, 2008). Without early intervention, ADHD symptoms that affect preschool age children will continue into school age and can cause other problems such as behavioral disorders, impulsivity, aggression, and socialization disorders. ADHD symptoms in preschool children persisted even until they were 6 years old, 33% of them were diagnosed with ADHD when they are entering the primary school age (McGoey, 2002). ADHD preschool children are at risk from school expulsion. As a result, they become restricted from pre-academic education, socialization, and classroom environment (Schmidt and Petermann, 2008).

## 2 LITERATURE REVIEW

### 2.1 Prevalence

To date, there have been few data on the prevalence of ADHD in preschool children internationally. The prevalence of ADHD in preschool children is estimated to reach 2%, other data say 6%, and some other say 18% based samples of parents and teachers of children of 3-5 age group. It was reported to reach about 6% in the US (Schmidt and Petermann, 2008), 5.2% in India, and 9.6% in Germany (Connor, 2002). The work of Hebrani et al. (2007) reveals that the



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prevalence of ADHD in preschool children in Iran reached 12.3%. A study on 104 preschool children from low income family in the US found that 5.7% of them met the DSM-IV diagnostic criteria. As many as 47 out of 79 (59.5%) children aged 2-5 years who were admitted to psychiatric clinics met the DSM-IV diagnostic criteria (Connor, 2002).

There have been no definitive data yet on the prevalence of preschool children with ADHD in Indonesia. Suharmini (2005) study reveals that 1.76% of 3,233 kindergarten students all around Yogyakarta met the ADHD category. The actual prevalence rate is estimated to be higher, especially in big cities.

## 2.2 Neurobiology and Causes of ADHD

Many studies have revealed a change in neurobiology of the central nervous system as a cause or etiology of ADHD. Studies on molecular biology, molecular neuropharmacology, and neuroimaging of the central nervous system (MRI) have successfully revealed the presence of neurobiological disorders in ADHD. Neuropharmacology data support the hypothesis of dopamine/norepinephrine regulatory disorder; i.e., inhibitory disturbance in the dominant noradrenergic prefrontal cortical area and subcortical area, which is predominantly dopaminergic. Stimulant drugs that serves as central nervous system noradrenergic and dopamine such as guanfacine, clonidine, bupropion, and atomoxetine, are quite helpful for those with ADHD (Connor, 2002).

Hereditary factors in ADHD have also long been known. Studies on twin children suggest that the heritability rate of ADHD ranges from 0.60 to 0.95. This figure means that as many as 60 to 95% of the variance of ADHD cases are caused by genetic factors rather than environmental factors (Hudzia et al., 1998). Nevertheless, the heritability rate of ADHD is always estimated to be lower than 1.0. This means that the cause of ADHD cannot be explained solely because of genetic factors, but environmental factors or interactions of genetic and environmental factors also play an important role in the etiology (causal factors) of ADHD (Connor, 2002). About a third of father of hyperactive children also suffer from the same disorders as that of their children in their childhood. The risk of ADHD in parents and close relatives of children with ADHD is increased 2–8 times. The risk of ADHD in monozygotic twins is also higher than in dizygotic twins (Judarwanto, 2009).

The role of genes and chromosomes as the etiology of ADHD is still not known for certain. Some of the genes associated with dopamine receptor codes and serotonin production, including DRD4, DAT, DRD5, DBH, 5-HTT, and 5-HTR1B, have been frequently associated with ADHD (Judarwanto, 2009). The presynaptic dopamine transporter protein (DAT-1) and the post-synaptic dopamine D4 receptor (DRD-4) have been well recognized as the site of action of the stimulant drugs. Various studies have found that deviations or polymorphisms in these genes lead to abnormalities in the structure of the child or adult brain with ADHD (Connor, 2002).

Studies using magnetic resonance imaging (MRI) found structural brain abnormalities. The prefrontal areas, basal ganglia, and vermix cerebellum of children with ADHD are smaller by 5-10% than those without ADHD. MRI also found lack of blood flow in the prefrontal cortex, anterior cingulatus, and striatum of both children and adults with ADHD (Connor, 2002).

## 2.3 Symptoms

Inattention, hyperactivity, and impulsivity are the characteristics of normal development of preschool age children (Harpin, 2005). However, preschool children with ADHD often exhibit more extreme behavioral problems than their peers. They appear less attentive, less organized, difficult to remain seated, and abusive, both verbally and physically, towards their peers. Nearly 30-60% of preschool children with ADHD (especially boys) often give noncompliant responses to instructions and authority figures. Thus, preschool children with ADHD are less able to cooperate and less productive in school (McGoey, 2002).

The parents of school-aged children with ADHD generally reveal that the ADHD symptoms have appeared before their children enter school. They are aware of something different about their children or indicative symptoms of ADHD from the earliest months or years (toddler). However, some children who show these symptoms grow as normal children and never get a diagnosis of ADHD (Schmidt and Petermann, 2008).

Bailey (2002) lists some of the common characteristics of children diagnosed with ADHD upon entering school age as follows:

- **Baby (0-12 month):**
  - To be restless or to stretch often;
  - To be not fond of holding;
  - To be less patient and easily frustrated;
  - To need paying attention to more than other babies;
  - To sleep less.

- **Toddler (1-3 years):**
  - To be inattentive;
  - To be continuously disturbed by the surrounding lights and noises;
  - To find it difficult to keep eye contact;
  - To be compulsive of fun things like video games or fond of playing outdoor that requires high energy;
  - To be overactive;
  - To be not fond of holding or activities that does not require movements and high energy;
  - To find it difficult to calm down after doing activities;
  - To be very impulsive: jumping onto chairs, jumping out of windows, or running out to busy streets.

- **Preschool age:**
  - To find it difficult to remain seated;
  - To be not fond of holding or activities that does not require movements like listening to stories;
  - To less attentive;
  - To be overactive;
  - To be talkative;
  - To be badly behaved;
  - To be clumsy;
  - To like to snatch toys from other children;
  - To not like waiting for a turn;
  - To aggressively behave.

## 2.4 Diagnosis

ADHD diagnosis can only be carried out on children at their school age; i.e., around 7, using the DSM IV-TR (American Psychiatric Association, 2000). This is due to the fact that during preschool age, the characteristics of ADHD can hardly have distinguished from those of normal development (McGoey, 2002). Nevertheless, based on the criteria of DSM IV-TR, the prevalence of preschool-aged children with ADHD is estimated to reach 2% (Lavigne et al., 1996), with inattention as the most commonly noticed symptom (McGoey, 2002). Prospective studies have also identified that the peak age of onset of ADHD is between the ages of 3-4 years (Connor, 2002).

In preschool age groups, ADHD is usually assessed using scales and behavioral observation. The ADHD-Rating Scale IV is now a standard assessment for preschool children, assessing the following symptoms (Schmidt and Petermann, 2008):

- To be less attentive;
- To get easily distracted;
- To be overactive;
- To exhibit noncompliant behaviour;
- To be unable to remain seated for 3-4 minutes.

## 2.5 Early interventions

The intervention for preschool-aged ADHD children can be broadly divided into: (1) pharmacological intervention and non-pharmacological/psychosocial intervention.

### 2.5.1 Pharmacological Interventions

The use of stimulant drugs to treat ADHD symptoms in preschool children is a subject of controversy with regard to drug side effects. In the US, the FDA (Food and Drug Administration) forbids the use of stimulant drugs for children under the age of 6. The most frequently used stimulant drug (90%) by preschool children is methylphenidate. Many studies have suggested that the use stimulant drugs to treat ADHD symptoms, based on data obtained from teachers and parents, yields in positive results such as: increased on-task behavior, decreased hyperactivity/impulsivity, increased attention span, increased compliance with instructions, increased social skills, and improved parent-child interaction.

The study also noted the side effects of stimulant drug use in pre-schoolers, including decreased social interactions, loss of appetite, and dysphoric mood (McGoey, 2002). A study by Firestone et al. (1998) in 32 preschool children with ADHD showed that the use of methylphenidate stimulant drugs had more severe side effects on preschool children than on school-aged children.

### 2.5.2 Parent-Training Interventions

Some studies suggest the effectiveness of parent-trainings to deal with preschool children with ADHD. These trainings have yielded positive results such as increased compliant of ADHD children with instructions, the ability of parents to make appropriate instructions, and the acquisition knowledge of appropriate parenting techniques by the parents. Parent-trainings provide knowledge of specific management skills to improve parent-child interaction skills, which will further improve the child's behavior (McGoey, 2002).

### 2.5.3 Behavioral-Management Interventions

Effective behavioral management for preschool-aged children with ADHD including: appropriate rewards, effective instruction and request, self-control teaching, and consistent use of discipline methods. However, self-instruction training using cognitive-behavioral methods yielded in unsatisfactory results. On the contrary, a single subject study on a preschool child with ADHD using daily report card system and self-monitoring package brought about positive results. Study on an ADHD child aged 5 yielded in a dramatic results: increased on-task behavior from 57% to 85%, decreased disruptive behavior from 29% to 7%, and decreased activities from 8 to 2 activities. Nevertheless, most studies were conducted in a laboratory setting, not a school setting and hence less generalizable. In addition, most of these studies also used small sample size and low integrity treatment and did not have any follow-up action after the research. Thus, despite promising results, these studies are less consistent and less conclusive, so further investigation and a more comprehensive replication need to be carried out.

### 2.5.4 Combination Interventions

Henry's (1987) study using combination interventions including pharmacological interventions, symbolic modeling, and parent training interventions to improve behavior during 14 weeks showed satisfactory results. In symbolic modeling, the children were shown a video game on how a child should comply with instructions of a teacher/parents for 5 minutes The combination of these three interventions were found more effective than a combination of pharmacological interventions and symbolic modeling, a symbolic modeling only, or a pharmacological intervention only. It was also revealed that parent trainings about positive behavioral management was more effective than symbolic modeling and that a combination of parent trainings about reductive behavioral management (e.g., time-out) was more effective than positive behavioral management (e.g., behavioral reinforcement through rewards).

### 2.5.5 Prognosis

The severity of inattention and hyperactivity in preschool aged children does not have a prognostic value of that they will develop similar problems when entering the school age. However, the impairment seems to have prognostic utility value. One of the measurements that can be used to measure impairment levels of ADHD in preschool children is Children's Problem Checklist (CPC). The CPC avoids asking questions related to academic matters because they are not appropriate for their development. The CPC consists of several common behaviors that indicate the presence of disorders in preschool children with ADHD such as: disruptive behavior, difficulty in relationships with peers and adults, low self-esteem, difficulty falling asleep, and often having an accident. In the following table are the CPC items that parents and teachers need to fill in:

Table 1: Children's Problem Checklist (CPC) Items

| Questions for Parents | Questions for Teachers |
|---|---|
| Does your child: | Does the child: |
| 1. disrupt family life? | 1. disrupt others in the classroom? |
| 2. have difficulties in relationships with siblings? | 2. have difficulties in relationships with peers at school? |
| 3. have difficulties in relationships with peers? | 3. have difficulties making friends with others? |
| 4. have difficulties in relationships with adults? | 4. have difficulties in relationships with teachers or other adults? |
| 5. feel something wrong with himself? | 5. feel something wrong with himself? |
| 6. have difficulties falling asleep? | 6. often have accidents like: trip, bumping, etc.? |
| 7. often have accidents like: trip, bumping, etc.? | |

Source: Healey et al. (2008).

### 2.5.6 Strategy for Children with ADHD-Like Behavioral Disorders

If you notice any ADHD symptoms in preschool children, you can employ the following strategies (Bailey, 2002; Snuggs, 2008):

- Simplify instructions for them. Arrange the instruction in a direct single sentence. ADHD children are forgetful. Arranged a well-structured schedule of children's daily activities. Breakfast, lunch, dinner, and break snacks should be at the same time every day;
- Give them enough time to release energy; e.g., by running around the park or backyard. If outdoor activities are not possible, use radio or music CD for them to dance to;
- Provide them with toys appropriate for their development ad to enhance their intelligence. ADHD children have an unstable emotion;
- Use integrative interactive learning techniques so they can learn fast. Use as many sensory functions as possible to teach them a new skill. When teaching colors, use objects perceptible by touch, smell, taste, or sight;

- Foster a supportive environment. Accept that ADHD children are prone to accidents. Provide drawers with a picture tag to help them remember what's in them;
- Use behavioral management techniques that can immediately be functioning. Give them rewards for behaving well as soon as possible. Otherwise, they will find it hard to see a relationship between action and consequence;
- Get ready for an unpleasant situation. When having to stay seated for a relatively long time period, provide them with small activities, snacks, and beverage so that they feel comfortable;
- To help them remember objects, use songs or music. Let them choose the song of their choice to help them remember;
- Make an effort to figure out their potentials. Provide them with objects that can enhance their potentials;
- Be consistent. Consistency is the most important part of behavioral management of ADHD children.

## 3 CONCLUSIONS

Early interventions are badly needed for preschool children. Although ADHD diagnosis can be carried out when they are 7 years old, early interventions are expected to prevent the symptoms to continue into adulthood. Interventions for ADHD symptoms in preschool children are expected to raise awareness of parents and teachers so as to enable early interventions. Appropriate early interventions are expected to reduce the ADHD symptoms in preschool children and stress level in the family and prevent the symptoms to persist until children enter the school age.

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