

Epidemiology of ADHD

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Abstract

In this selective review of the literature, we present recent data on the epidemiology of Attention Deficit Hyperactivity Disorder (ADHD) across the life-cycle. The worldwide ADHD prevalence rates are around 5.3% in children and adolescents and 2.5% in adults. The literature suggests that 40 – 60% of affected children continue having the disorder during adulthood, depending on the criteria for persistence applied. Demographic correlates such as gender, socio-economic stratum and ethnicity impact on prevalence rates in the community. There are clear barriers for treatment access even in developed countries.

Key-words: ADHD, Hyperkinetic Disorder, prevalence, epidemiology.

Introduction

An understanding of the epidemiological aspects of ADHD may provide insights into its distribution and aetiology, as well as information for planning the allocation of funds in mental health services to deal with the disorder. ADHD is a neurobiological disorder with a pattern of persistent and impairing symptoms of inattention, hyperactivity and impulsivity affecting individuals across the life cycle (1).

First, it is important to note that our two main classification systems used for diagnosing mental disorders, the International Classification of Diseases, tenth revision (ICD-10) and Diagnostic and Statistical Manual of Mental Diseases, fourth edition, text revision (DSM-IV-TR) (2,3), employ different nomenclature and criteria to define the disorder. Although the list of symptoms and the evaluated constructs are very similar between DSM-IV-TR and ICD-10, differences emerge in the way the diagnosis is constructed. The ICD-10 uses the nomenclature of Hyperkinetic Disorder (HD) and requires both a minimum number of symptoms in all three dimensions (inattention, overactivity, and impulsivity) and presence of each symptom in at least two different settings. Furthermore, the ICD-10 has mood, anxiety and developmental disorders as exclusion diagnoses. DSM-IV-TR allows the establishment of ADHD diagnosis in the presence of mood and anxiety disorders, but not of pervasive developmental disorders (4).

Prevalence

Numerous cross-sectional, clinical and longitudinal studies have been conducted globally in attempts to determine the prevalence of ADHD in the community for both children and adults. Studies have found rates ranging from as low as 0.9% to as high as 20% (5). In an effort to gain a better understanding of the prevalence of ADHD and the reasons for this variability, Polanczyk et al. (6) conducted a comprehensive systematic review and meta-analyses including 102 investigations with non-referred samples of children and adolescents from all continents and documented a worldwide pooled prevalence of ADHD of 5.29% (CI95% = 5.01 – 5.51%). However, a significant heterogeneity among rates emerged. Through a meta-regression approach, the authors demonstrated that the three main reasons for the variability in prevalence rates were: information source used, presence or not of a definition of impairment and diagnostic system utilised (the largest differences were detected among studies using DSM-IV and ICD-10). Thus, general practitioners, paediatricians and child psychiatrists in the United Kingdom should expect to find fewer cases using ICD-10 criteria for HD than their North-

American colleagues using DSM-IV criteria for ADHD. However, the findings from the study from Polanczyk et al. (6) suggest that when methodological differences are adjusted among investigations, no significant differences are detected in prevalence rates among Europe and North America. After this extensive review, two very relevant studies were published on the prevalence of ADHD in children and adolescents in the US. Merikangas et al. (7) found a 12-month prevalence of ADHD around 8.6% (± 0.7) in a nationally representative probability sample of non-institutionalised children and adolescents (8–15 years of age) from the National Health and Nutrition Examination Survey. Interestingly, Merikangas et al. (8) conducted another nationally representative survey with 10,123 adolescents aged 13 to 18 years from the National Comorbidity Survey – Adolescent Supplement, documenting a very similar ADHD prevalence of 8.7% (± 0.7). However, lifetime prevalence was assessed in this study.

There is a strong and growing interest in the diagnosis of ADHD in adults. While the WHO World Mental Health survey that included 10 countries produced a global adult ADHD prevalence rate of 3.4%, the range varied between 1.2% (Spain) to 7.3% (France) (9). Simon et al. (10) conducted surveys of ADHD in adults using a similar approach to the one developed by Polanczyk et al. (6) in children and adolescents. They found a pooled ADHD prevalence rate of 2.5% (CI95% = 2.1 – 3.1%). However, it is important to note that authors were able to find only 6 studies to include in this meta-analysis.

Persistence across development

ADHD was first conceptualised as a disorder restricted to childhood and adolescence. Longitudinal studies showed that although there is a clear decline of symptoms with age, they tend to persist in a variable proportion of people who are more frequently impaired than controls in several major life activities (11). Longitudinal studies available are limited by the relatively short periods of follow up (only one study evaluated subjects in their early thirties) and by the historical changes in classificatory systems. Similarly to prevalence estimates of the disorder in childhood, estimates of persistence of the diagnosis vary substantially across studies, from 4% to 80%. This is probably due to methodological artefacts, such as the definition chosen for persistence in adult life (syndromic versus symptomatic), origin of the sample (non-referred or clinical), attrition rates and age of individuals at follow-up (5, 12). One of the major difficulties in determining the persistence of ADHD in adults is the difficulty in establishing which criteria best capture the latent construct of this diagnosis in adulthood, since the current DSM/ICD ADHD criteria were developed only in samples of children and adolescents. There are clinically-relevant doubts about whether DSM/ICD criteria adequately describe the phenotype in adults or whether broader conceptualisations, including executive function deficits and emotional impulsivity are better for adults (4). In addition, there is a clear decline of hyperactive symptoms across development (13), making motor hyperactivity less relevant for diagnosing ADHD in adults. In a 15 year follow-up study of a referred sample of hyperactive children, Weiss et al. (14) tracked the lives of 63 subjects with the disorder and 41 controls. Of the 63 hyperactive subjects, 66% continued to have disabling symptoms of ADHD and 23% had an antisocial personality disorder. In general, it is expected that 40 – 60% of affected children from clinical samples continue to have the disorder during adulthood.

An important piece of data lacking in the literature is what the predictors of persistence of ADHD during the life cycle are. Although the presence of symptoms in both dimensions (inattention and hyperactivity/impulsivity) during childhood and childhood treatment of ADHD have been suggested as potential predictors (15), it is not clear whether they might not only be mediators of severity. More data from non-referred longitudinal studies are definitely needed.

Demographic Correlates

Studies in children consistently suggest that the ADHD prevalence is higher in boys than in girls. In our systematic review and meta-regression, the pooled ADHD prevalence for boys was 2.45 times higher than that for detected girls (only non-referred samples were included) (6). The prevalence among girls seems to be higher in community samples than in clinical samples, probably because there is a barrier to diagnosis and treatment referral for females. The male preponderance even in non-referred samples clearly decreases with age with the result that females are overrepresented in some adult samples (10).

The impact of ethnic and socio-economic issues on the prevalence rates of ADHD is much more controversial and deserves much more research. Although some studies suggest no effect of ethnicity on prevalence rates of ADHD, others suggest a higher prevalence of ADHD symptoms in African-American children (16). Regarding socio-economic stratum (SES), the issue is even more complicated. Positive and negative associations between SES and ADHD appear in the literature. Even in investigations reporting an association, it is impossible to disentangle the direction of the association. Parental ADHD diagnosis is frequent in families of ADHD children and ADHD has been correlated with lack of financial independence, lower SES and lower educational attainment levels later in life.

Treatment access

Although there is a clear increase in the rates of methylphenidate consumption worldwide (17), the vast majority of subjects affected by ADHD are not receiving treatment in health systems either in developed or in developing countries. The situation is even worse for adults and minorities both in the US (16) and for subjects at all ages worldwide (18).

The study of barriers for treatment access is extremely context dependent. A recent study in Great Britain suggested that child factors (e.g., severity of ADHD and a comorbid emotional or behavioural disorder) were the main determinants of service use. Moreover, the authors did not identify an excess of ADHD medication use (19).

GP Comment

What have I learned from this paper?

1. The overall prevalence of ADHD is about 5% but the rate depends on the assessment criteria used; more stringent criteria (ICD10) are used in the UK, resulting in a lower apparent prevalence.
2. In community samples, the rate in boys is about 2½ times that in girls; clinic samples might show a much higher preponderance of boys because males are more likely to present with difficult behaviour.
3. About 40-60% of children with ADHD will continue to have the condition into adulthood and many of those with ADHD, both children and adults, will have additional psychiatric disorders or other problems.
4. Knowing that the rates of ADHD are so high in both children and adults will make me very aware of the possibility of this diagnosis, emphasising the importance of referring for specialist assessment for treatment, although the secondary care services for adult ADHD are less well provided.

Dr John Kedward, GP, Bedford.

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Potential conflict of interests: Dr Luis Augusto Rohde was on the speakers' bureau and/or acted as consultant for Eli-Lilly, Janssen-Cilag, Novartis and Shire in the last 3 years (less than US\$ 10,000 per year and reflecting less than 5% of his gross income per year). He also received travel support (air tickets and hotel) for attending two Child Psychiatric Meetings from Novartis and Janssen-Cilag in 2010. The ADHD and Juvenile Bipolar Disorder Outpatient Programs chaired by him received unrestricted educational and research support from the following pharmaceutical companies in the last three years: Abbott, Bristol-Myers Squibb, Eli-Lilly, Janssen-Cilag, Novartis, and Shire. He also receives research support from Brazilian government institutions (CNPQ, FAPERGS, HCPA and CAPES). Ms Rachel Verin has no conflict of interests. Dr Guilherme Polanczyk has served as a speaker and/or consultant to Eli-Lilly, Novartis, and Shire Pharmaceuticals, developed educational material for Janssen-Cilag, and received unrestricted research support from Novartis and from the National Council for Scientific and Technological Development (CNPq, Brazil).