

Chapter 3

Pre-, Peri-, and Post-Natal Risk Factors in ADHD

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ABSTRACT

Attention deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder most commonly found in childhood with its core symptoms manifesting as inattention, impulsiveness, and hyperactivity. As ADHD generates a substantial rate of burden to the society in terms of economic and medical resources used, priority is given to explore the risk factors that contributes towards the multifactorial origin of this disorder to offer possible preventive and therapeutic interventions. With heritability accounting for 75% to 80% of the variability seen in ADHD, the remaining are explained through environmental risk factors that are exposed during critical period of pre-, peri-, and postnatal development. Though literature on the risk factors have been mostly controversial, certain associations have been made with regards to ADHD pathophysiology.

INTRODUCTION

Attention Deficit/ Hyperactivity Disorder (ADHD) is the most common neurodevelopmental disorder which manifests in early childhood and persists mostly into adolescence and adulthood (Sagiv et al, 2013). It is characterized by its core symptoms of inattention, impulsiveness and hyperactivity and accessory symptoms such as disorganization, affect control, hot temper and affective liability (Tole et al, 2019; Zappitelli, Pinto and Grizenko, 2001). Children with ADHD show considerable variation in their symptom severity, degree of impairment and presence of other co-morbid conditions (Linnet et al, 2003).

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Prevalence varies from 5% to 10% in children (Sagiv et al, 2013) and approximately 3% in adulthood (Tole et al, 2019) with more inattentiveness exhibited and less of hyperactivity and impulsivity. ADHD generates a substantial burden on the quality of life and psychosocial functioning of affected children and their family members along with a considerable strain on medical, educational and social resources and therefore, high priority is given to study and investigate the risk factors associated with it (Tole et al, 2019; Sagiv et al, 2013).

The etiology of ADHD is multifaceted with an interplay of gene, development and environmental factors (Sagiv et al, 2013). Heritability has been considered as the strongest factor in the development of ADHD with genetic factors responsible for approximately three-quarters of the variability found in ADHD; that is, up to 75%-80% of symptoms seen in ADHD individuals are due to genetic component (Mill and Petronis, 2008; Grizenko et al, 2008). First-degree relatives of the affected person have a 2 to 8-fold risk for developing this disorder (Grizenko et al, 2008). The remaining were due to environmental factors which includes several pre-, peri- and postnatal risk factors. Previous literature has shown that insults that transpires during critical pre- and perinatal period of development tend to have a direct effect on the fetal brain leading to neurochemical alterations that are commonly associated with ADHD and other psychiatric conditions (Zappitelli, Pinto and Grizenko, 2001). As per the programming hypothesis, unfavorable intrauterine environment increases the susceptibility to disorders in later life (Linnet et al, 2003). However, research on various influences that may predispose to neonatal brain trauma in the etiology of ADHD has come out to be controversial (Zappitelli, Pinto and Grizenko, 2001).

Prenatal Stressors

The focus on the impact of in utero toxins on the developing fetus has been on three exposures; mainly, cigarette smoking, alcohol intake and use of illicit drugs. The neurochemical hypothesis on the pathogenesis of ADHD describes a dysfunction of dopaminergic systems in the prefrontal cortex areas of the brain (Zappitelli, Pinto and Grizenko, 2001). According to animal studies, rats and pups that have been exposed to nicotine during their prenatal period exhibited a decrease in their striatal dopaminergic receptor binding sites. Existing evidence on prenatal risk factors and etiology of ADHD is considered to have a genetic origin. Approximately 10-40% of the variance is associated to environmental causes. There is insufficient literature to support a causal relationship between prenatal risk factors and the development of the disorder. It is difficult to separate the effect of prenatal risk from postnatal risk factors such as social adversity, mental health of the parent and inherited factors transmitted from the mother (Emma Sciberras et al, 2017). Mothers who experienced emotional problems and stress during pregnancy lead to Attention Deficit hyperactivity Disorder of their children (Simon 2016).

A study (Knopik et al., 2005) conducted through diagnostic telephone interview, focused on the contributions of parental alcoholism, prenatal substance abuse and genetic transmission as risk factors for ADHD. They conducted a twin study on female adolescents so /as to see the separate effects of both genetic and environmental factors. The results found the following as risk factors among the sample:

- Parental alcoholism: There was an increased risk of the child developing ADHD if alcoholism was prevalent among the parents.
- Parental substance use and perinatal risk factors: It was seen that smoking during pregnancy was associated with an increased chance of low birth weight in the child. These associations remained even when smoking was controlled during the period of pregnancy. Results showed that there

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