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Child ADHD Risk Linked to Mothers Use of Acetaminophen

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Abstract

It is an article which gives data based on research studies conducted in prenatal mothers and children were followed up for the first few years of birth.The association of use of acetaminophen in prenatal period is the cause of ADHD in children…and some studies was observed that they have attributes to familial confounding and there are very fewer studies are published in India in related to this,recommended that modifications are required in the antenatal care recommendations and drugs usage in prenatal period

INTRODUCTION

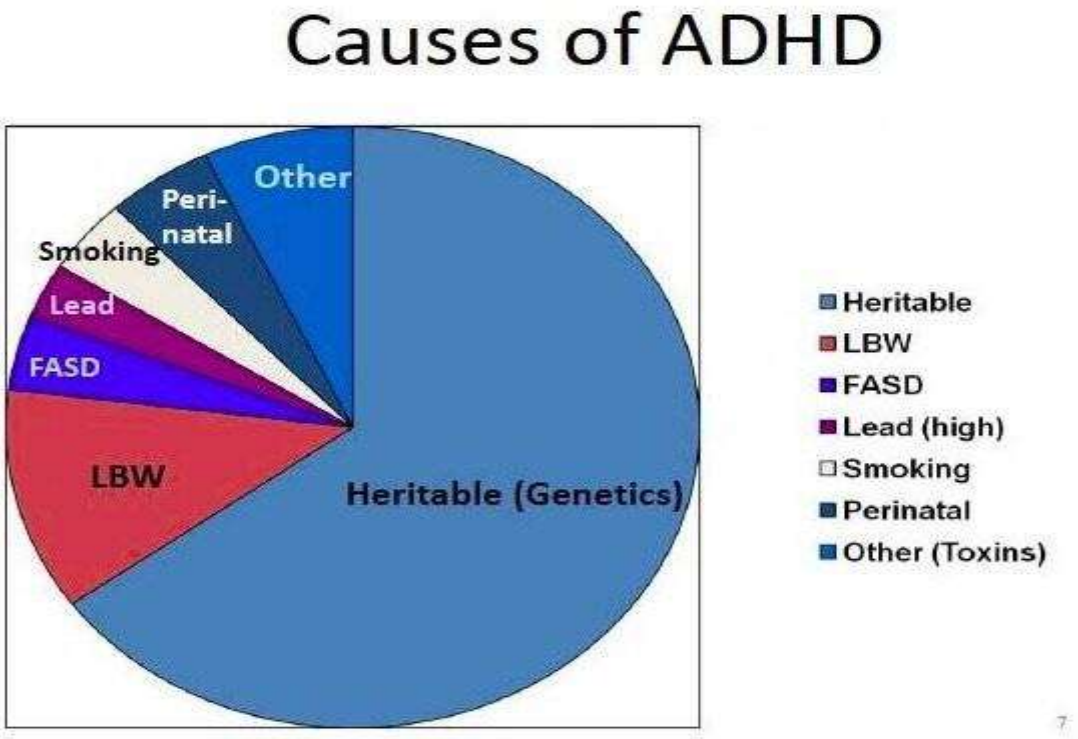
The global prevalence of ADHD is estimated to be between 5.29% and 7.1%. ADHD is a common childhood-onset psychiatric disorder that can significantly impair functioning, The prevalence of ADHD in India varies from 2% to 29.2%, depending on the study and the region. Paracetamol (*N*-acetyl-*p*-aminophenol (APAP), otherwise known as acetaminophen) is the active ingredient in more than 600 medications used to relieve mild to moderate pain and reduce fever[1]. It is an article which gives data based on research studies conducted in prenatal mothers and children were followed up for the first few years of birth.The association of use of acetaminophen in prenatal period is the cause of ADHD in children…and some studies was observed that they have attributes to familial confounding and there are very fewer studies are published in India in related to this,recommended that modifications are required in the antenatal care recommendations and drugs usage in prenatal period

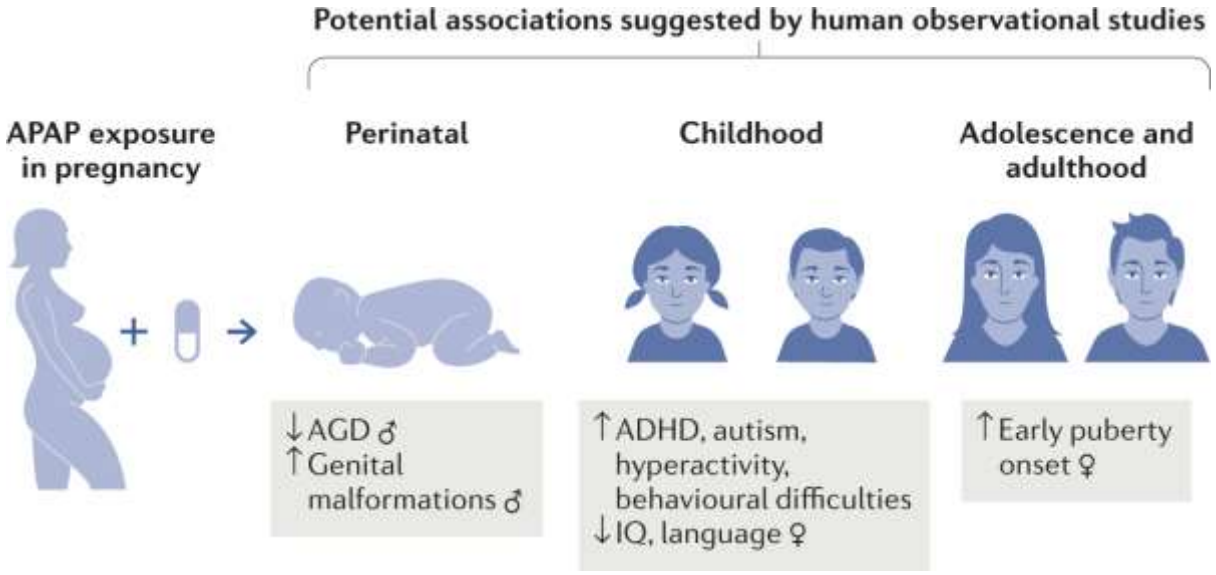
DEFINITION

It is a developmental disorder characterized by inattention, hyperactivity, and impulsivity.

CAUSES

The exact cause is unknown, and possible risks include prematurity, poor brain growth, genetic inheritance, and perinatal.





STRUCTURAL FORMULA AND CHARACTERISTICS

Acetaminophen, also known as paracetamol, has a chemical structure consisting of a benzene ring with a hydroxyl group (-OH) at the para position (position 4) and an amide group (-NH-CO-CH3) attached to the nitrogen atom at that same para position; its molecular formula is C8H9NO2, making it a derivative of p-aminophenol.

KEY CHARACTERISTICS OF ACETAMINOPHEN:

- **Antipyretic Analgesic properties:** Primarily used as a pain reliever and fever reducer.
- **Non-opioid:** Unlike some other pain medications, acetaminophen does not belong to the opioid class.
- **White, odorless powder:** In its pure form, acetaminophen appears as a white crystalline powder.

- **Solubility:** Soluble in water, ethanol, and other polar solvents.
- **Melting point:** Around 169-170.5°C.
- **Mechanism of action:** inhibiting prostaglandin synthesis in the central nervous system.

ACETAMINOPHEN –MEDICATION –PREGNANCY

The above-mentioned tile of the impact of acetaminophen in the prenatal period has an effect on children with ADHD, the following study results and reviews of research studies conducted between 2006,2011,2017, and 2025 are stated below.

Acetaminophen is the recommended medication for pregnant women with fever or pain and is widely used during pregnancy. Results have suggested that 65% to 70 % of pregnant women in the United States and 50% to 60% of pregnant women in western and northern Europe use acetaminophen.

Acetaminophen crosses the placenta and can be traced in the infant's urine after prenatal exposure, maternal prenatal acetaminophen use is associated with a higher hazard rate for offspring with ADHD.

The considerably increased rate of ADHD associated with long-term prenatal exposure to acetaminophen (ie, >29 days) is in line with the findings.

This study investigated the use of acetaminophen during pregnancy and children's risk of autism, ADHD, and intellectual disability among nearly 2.5 million children in Sweden. This analysis featured prospectively collected antenatal and prescription records to capture medication use in a nationwide cohort, clinical neurodevelopmental diagnoses, and sibling comparisons to account for unobserved familial confounding.

The results showed that Acetaminophen use during pregnancy was not associated with children's risk of autism, ADHD, or intellectual disability in sibling control analyses. This suggests that associations observed in models without sibling control may have been attributable to confounding[3].

This research tracked a cohort of 307 women from 2006 to 2011, blood samples were taken during pregnancy. The results showed plasma biomarkers for acetaminophen in the samples.

The children born to these mothers were followed for 8 to 10 years. Among the women who did not use acetaminophen during pregnancy, the rate of ADHD was 9%, but for the women who used acetaminophen, the ADHD rate among their offspring was 18%.

Acetaminophen metabolites were detected in 20.2% of maternal plasma samples. Children whose mothers had these biomarkers present in their plasma had a 3.15 times higher likelihood of an ADHD diagnosis compared with those without detected exposure[4].

A retrospective cohort study was conducted to investigate the neurodevelopmental outcomes of preterm infants < 29 weeks gestation postnatally exposed to acetaminophen. 945 infants were included in this study, 120 were in the acetaminophen group. The results concluded that there was no difference in any of Bayley-III cognitive, language, or motor composite scores of < 85 between the two groups for postnatal acetaminophen exposure There was no difference in neurodevelopmental outcome between the acetaminophen-exposed and non-exposed groups. Our results need validation in larger cohorts[5].

As scientists, medical experts, and public health professionals, we are concerned about increasing rates of neurological, urogenital, and reproductive disorders. We are witnessing disturbing increases in the number of children with cognitive, learning, and/or behavioral problems. For example, the US National Health Interview Survey reported that between 2009 and 2017, approximately one in six children aged 3–17 years had a developmental disability diagnosis. A 9.5% increase was observed in the overall rate of developmental disabilities between 2009–2011 and 2015–2017[5].

Researchers analyzed data from the Boston birth cohort a long-term study of factors influencing pregnancy and child development. They collected umbilical cord blood from 996 births and measured the amount of acetaminophen and two of its by-products in each sample. By the time the children were an average of 8.9 years, 25.8% had been diagnosed with ADHD only, 6.6% with ASD only, and 4.2% with ADHD and ASD. The researchers classified the amount of acetaminophen and its by-products in the samples into thirds, from lowest to highest. Compared to the lowest third, the middle third of exposure was associated with about 2.26 times the risk for ADHD. The highest third of exposure was associated with 2.86 times the risk. Similarly, ASD risk was higher for those in the middle third (2.14 times) and highest third (3.62 times).

The authors conclude that their results support earlier studies linking acetaminophen exposure in the womb with ADHD and ASD and underscore the need for additional research. The U.S. Food and Drug Administration urges careful consideration before using any pain-relieving medication during pregnancy[8].

RECOMMENDATIONS

The news update on the use of acetaminophen, the medication was approved decades ago, and may need re-evaluation by the FDA. Acetaminophen was never evaluated for fetal exposures about long-term neurodevelopmental impacts," pediatrician Sheela Sathyanarayana from UW Medicine told Science Alert[7].

Due to the current study's small sample size, the data was not enough to change the minds of officials at the US Food and Drug Administration (FDA), the European Medicines Agency (EMA), the American College of Obstetricians and Gynecologists (ACOG), the Society of Obstetricians and Gynecologists of Canada, and the Society for Maternal-Fetal Medicine – all of whom maintain that acetaminophen poses minimal risk when using the lowest dose as needed during pregnancy.

Despite the study's limitations, the findings suggest that it may be time for the FDA to reevaluate acetaminophen's safety during pregnancy. Further studies will be necessary to establish a clearer understanding of the potential risks involved.

In India we are lacking with research studies about this and longitudinal, correlational, and cohort studies are recommended to find the impact of prenatal exposure to acetaminophen risk for developing ADHD in children.

CONCLUSION

The above article provides data about how the use of acetaminophen in the prenatal period affects the fetus and there are chances for ADHD……It is recommended for further studies and for the FDA to reevaluate acetaminophen's safety during pregnancy and recommended that pregnant women urge careful consideration before using any pain-relieving medications.

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