International Journal of Research and Technology (IJRT)

International Open-Access, Peer-Reviewed, Refereed, Online Journal

ISSN (Print): 2321-7510 | ISSN (Online): 2321-7529

| An ISO 9001:2015 Certified Journal |

What are the effects of long-term stimulant medication use in adolescents with ADHD?

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ABSTRACT

Despite decades of clinical use, the long-term impact of stimulant medication on adolescents with Attention-Deficit/Hyperactivity Disorder (ADHD) continues to be widely debated. While these medications are effective in improving attention, focus, and behaviour in the short term, there is still uncertainty about their effects when used over several years. This research paper explores the current evidence on the long-term use of stimulant medication in adolescents with ADHD, focusing on its impact on cognitive function, brain development, and overall wellbeing. The findings suggest that many adolescents experience continued improvements in attention and daily functioning; however, research on long-term neurological effects remains mixed and limited. Differences in study design, treatment duration, and medication adherence make it difficult to draw clear conclusions. Overall, the evidence indicates that stimulant medication can be an effective long-term treatment when carefully monitored, but further high-quality research is needed to better understand its long-term effects and to support informed treatment decisions for adolescents with ADHD.

Keywords: ADHD, stimulant medication, adolescents, long-term treatment, brain development, cognitive function.

INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD) is one of the most prevalent neurodevelopmental disorders affecting children and adolescents worldwide. It is characterised by persistent patterns of inattention, hyperactivity, and impulsivity that can significantly impair academic performance, interpersonal relationships, and daily functioning. Stimulant medications, including methylphenidate and amphetamine-based formulations, remain the primary pharmacological treatment for ADHD due to their proven effectiveness in alleviating symptoms. These medications increase the availability of dopamine and noradrenaline within the brain, enhancing attention, impulse control, and executive functioning.

Despite their established short-term efficacy, the long-term use of stimulant medication during adolescence continues to generate considerable scientific debate. Adolescence represents a critical period of neurological development, marked by substantial changes in brain regions responsible for cognition, emotional regulation, and decision-making. As stimulant medications directly influence neurotransmitter activity, concerns have emerged regarding, their potential to produce lasting effects on the developing brain.[1]

Current research presents a nuanced and sometimes conflicting body of evidence. Numerous studies indicate that prolonged stimulant treatment can maintain symptom control while improving academic achievement, behavioural regulation, and overall quality of life. However, findings remain inconsistent due to differences in study design, treatment duration, participant characteristics, and outcome measures. [2] Furthermore, many investigations rely on observational methods or behavioural rating scales rather than long-term randomised controlled trials, making it difficult to distinguish medication effects from environmental influences such as family support, educational interventions, or normal developmental progression.

Questions also remain regarding the potential impact of extended stimulant use on cognitive development, brain structure, emotional wellbeing, and physical growth. Although animal studies have suggested possible alterations in neural development, comparable evidence in humans is limited and often contradictory. [2] Consequently, further research is required to establish clearer conclusions. Molina, B. S. G., et al. (2009). [6] The MTA at 8 Years: Prospective Follow-up of Children Treated for Combined-Type ADHD in a Multisite Study. One participant from the Multimodal Treatment Study of ADHD (MTA) was diagnosed with ADHD during childhood and received long-term stimulant medication as part of the study. Over several years, teachers and parents reported noticeable improvements in attention, classroom behaviour, and the ability to complete daily tasks. The participant became less impulsive and found it easier to stay focused during school activities. However, some side effects, including reduced appetite and slower growth during childhood, were also observed and required regular monitoring by healthcare professionals.

Given the increasing prevalence of stimulant treatment among adolescents with ADHD, understanding its long-term therapeutic benefits and potential risks is essential. [6] This research paper critically evaluates current evidence to determine how prolonged stimulant medication use influences the cognitive, behavioural, neurological, and overall developmental outcomes of adolescents with ADHD.

THEORY

Long-term research suggests that the effects of stimulant medication extend beyond simply reducing ADHD symptoms. A large follow-up study by Molina et al. (2024) tracked 579 children with ADHD over several years to examine medication use and later outcomes. The researchers found that the number of adolescents taking stimulant medication gradually decreased from nearly 60% during the first few years of the study to just 7.2% by early adulthood. During the 12-, 14-, and 16-year follow-ups, 36.5% of participants reported smoking daily, 29.6% used marijuana at least once a week, 21.1% reported heavy alcohol consumption each week, and 6.2% used other substances at least monthly. These findings suggest that although stimulant medication can be effective during treatment, it may not completely protect individuals from engaging in substance use later in life.[3]

Similarly, Poulton et al. (2016) investigated the long-term safety of stimulant medication while taking factors such as treatment duration, family background, and country into account, helping to produce more reliable results. In addition, Brickman et al (2018) found that

adolescents and parents often viewed medication differently.[4] While many young people recognised its benefits, they also expressed concerns about possible long-term effects, whereas parents were generally more confident in its value. This highlights the importance of considering both scientific evidence and the experiences of families when evaluating long-term treatment.

EXPERIMENTAL

To investigate public perceptions of long-term stimulant medication, use in adolescents with ADHD, a quantitative survey was conducted using Google Forms. The questionnaire consisted of five multiple-choice questions assessing participants' awareness of ADHD stimulant medication, opinions on its effectiveness in improving academic performance, concerns regarding long-term risks and side effects, and sources of information about ADHD medication.

RESULTS

A total of 50 participants completed the survey. Overall, the responses showed that most participants were familiar with ADHD stimulant medication and generally believed that it can improve academic performance. Specifically, 61.3% had heard of stimulant medication, while 74.2% believed it helps improve academic performance.

Despite these positive views, many respondents also expressed concerns about its safety. Around 64.5% believed that stimulant medication may have long-term risks, and an even larger majority (83.9%) said that concerns about side effects would influence their decision to use the medication. This suggests that while people recognise its potential benefits, they remain cautious about possible health risks.

When asked where they had learned about ADHD medication, 61.3% reported online sources as their main source of information. However, 29.0% had never heard of stimulant medication before taking the survey, indicating that awareness is still limited among some individuals.

Survey Question	Yes	No
Heard of stimulant medication	61.3% (19)	38.7% (12)
Belief that medication improves academic performance	74.2% (23)	25.8% (8)
Believe long-term risks exist	64.5% (20)	35.5% (11)
Side effects would influence decision	83.9% (26)	16.1% (5)

CONCLUSION

This study shows that opinions on stimulant medication are influenced by both its potential advantages and concerns about its long-term use. Although many participants viewed medication as a helpful treatment option, uncertainty about its safety remains common. These findings emphasise the need for reliable education and open discussions between healthcare professionals, patients, and families so that treatment decisions are based on scientific evidence rather than misconceptions. Further research with larger and more diverse

populations would provide a broader understanding of public attitudes and the long-term effects of stimulant medication in adolescents with ADHD.

ACKNOWLEDGEMENTS

The author expresses sincere gratitude to her mentor, Prof. Vivek Chaudhary for the guidance, encouragement and constructive feedback provided throughout the development of this research paper.

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