

Research Paper

Are Pharmacological or Non-Pharmacological Treatments More Effective in Treating ADHD in Children Aged Under 18?

Kaartika Chitturi^{1*}, Harshada J S², Nida Dudekula³

ABSTRACT

Attention Deficit Hyperactivity Disorder (ADHD), is one of the most common executive function disorders in children today which is often carried into adulthood. Children and adolescents with ADHD have greater difficulty existing in social environments such as school, doing everyday tasks and are often unable to meet with deadlines and commitments made. Research also suggests that adults with ADHD are less likely to have graduated from high school or obtain a college degree (Biederman et al., 2006). Therefore, treatment for ADHD is crucial for children so that they can lead a life where doing everyday tasks isn't a burden. There are several treatments for ADHD all of which can be classified into pharmacological and non-pharmacological. Both types of treatment are thoroughly researched and practiced by professionals, however there is still debate on which is more effective. Thus, by conducting a survey, collecting the opinions of several professionals, I've discovered that the best treatment is subjective to the patient and symptoms faced by them.

Keywords: *Attention Deficit Hyperactivity Disorder, ADHD, Treatments*

Symptoms associated with ADHD include hyperactivity, impulsivity and inattentiveness significantly. While these may seem like common traits of many children, they have a much worse impact on the life of a child with ADHD. These symptoms negatively impact the functioning and behaviour of children and adolescents with ADHD, causing them to have greater difficulty going through day-to-day life compared with neurotypical children.

Despite the prevalence of the disorder among children and adults alike, there continues to be a widespread misunderstanding of the disorder's nature. While clinicians assume that ADHD is simply a behaviour disorder, which is identified in children by measuring their degree of hyperactivity and impulsivity, ADHD is a cognitive disorder which causes developmental impairment of executive functions in the self-management system of the brain.

¹Psychology and Biology Professor

²Psychology and Biology Professor

³Psychology and Biology Professor

*Corresponding Author

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A lifetime impairment survey assessed the impairment and symptoms of ADHD in children and adolescents coming to the conclusion that ADHD had a negative impact on all the aspects of life investigated (Caci et al., 2013). Untreated ADHD is further associated with poorer long-term social function (Harpin, Mazzone, Raynaud, Kahle & Hodgkins, 2016). This proves that treating ADHD is crucial in order for children to have a better quality of life.

While there is no cure for ADHD, the symptoms can be managed if the right treatment is prescribed. Treatments for ADHD range between pharmacological and non-pharmacological, both of which have their advantages and disadvantages which I will further evaluate in my literature review. While both treatments have proved to be effective, there is still much room for improvement considering that parents of children with ADHD have expressed that prior diagnosis, they had limited knowledge on ADHD. Although they reported improved knowledge after child's diagnosis, they continued to express dissatisfaction on the resources and information they were being provided. I aspire to contribute by tackling this issue by evaluating both types of treatments provided for children and adolescents with ADHD and reaching a conclusion on the most efficient method of treatment for ADHD in children and adolescents.

PHARMACOLOGICAL TREATMENTS FOR ADHD

Pharmacological treatments can be categorised into stimulant and non-stimulant medications.

ADHD brains have low levels of the neurotransmitters called norepinephrine and dopamine. These chemicals modulate some brain functions such as alertness, action, motivation, learning ability and memory processes (Slamloo & Fazlali, 2020). Stimulant medications help increase the level of dopamine and norepinephrine to an optimal level. Some stimulant chemicals are methylphenidate and amphetamine. These enhance the impact of dopamine and norepinephrine in the brain, improving the executive functions and ability to focus while reducing hyperactivity and impulsivity in patients suffering from ADHD (Mechler, Banaschewski, Hohmann & Häge, 2021)

Stimulants are an effective treatment for managing ADHD symptoms, targeting disruptive and impulsive behaviour, short attention span, and hyperactive symptoms. They are proven to have improved ADHD symptoms in about 70–80% children (Advokat & Scheithauer, 2013).

Methylphenidate and amphetamine both can have a range of adverse effects which are mild and usually temporary. Common adverse effects include decreased appetite, lack of sleep, increased blood pressure and pulse, headaches, irritability and stomach aches. Previous epidemiological data suggests that the occurrence of serious adverse effects while unlikely, cannot be completely excluded (Graham & Coghill, 2008).

Non-stimulant drugs include atomoxetine which also works by increasing norepinephrine and dopamine levels in the brain. Common adverse effects of atomoxetine in children and adolescents are nausea, vomiting, fatigue, decreased appetite and drowsiness (Mechler et al., 2021).

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Clonidine and guanfacine on the other hand have a different action mechanism compared to the other drugs mentioned above. Adverse effects of these drugs are commonly drowsiness, fatigue, irritability, insomnia and nightmares (Mechler et al., 2021).

While non-stimulant drugs are efficient in treating ADHD, their effect compared to that of stimulants is much lower. However, there are benefits to non-stimulant drugs which must be considered. Firstly, the effects of non-stimulant medication while treating ADHD are not observed until several weeks after the commencing the treatment (6–12 weeks with atomoxetine; 2–4 weeks with clonidine and guanfacine). Additionally, clonidine and guanfacine have been approved “as adjunctive therapy to stimulant medications”, referring to the increase in the effectiveness of the treatment and/or a decrease in the adverse effects such as lack of sleep, increased blood pressure and heart rate. Similarly, atomoxetine is observed to have fewer adverse effects, predominantly regarding decreased appetite and growth problems (Mechler et al., 2021).

NON-PHARMACOLOGICAL TREATMENTS FOR ADHD

Non-pharmacological treatments for ADHD is significantly about behaviour management, primarily targeting the functional impairments rather than the symptoms of ADHD (Piffner & Haack, 2018). Functional impairment refers to the limitations caused by ADHD the symptoms of ADHD which can include:

- Noncompliance and lack of independence in completing daily chores and routines.
- Forgetful, need for frequent reminders to get stuff done, disorganisation and lack of attention to details/careless mistakes.
- Co-occurring aggression and defiance towards others.

One of the most common methods of behaviour management in children is behavioural parent training. Parents of children with ADHD deemed their relationship with their child to be more negative than parents of children without ADHD suggesting ineffective parenting on their part (Gerdes, Hoza & Pelham, 2003). The CDC claims that behavioural therapy “is most effective in young children when it is delivered by parents.” Parent training is recommended for young children because parents have the greatest influence on their child’s behaviour and young children are not fully fledged to be able to make significant lifestyle and behavioural changes without their parents’ help.

Behavioural parent training focuses on three main objectives:

- Providing psychoeducation about ADHD and the behavioural framework for treatment
- Teaching effective parenting skills for improving desired behaviour and decreasing the problem behaviour through altering antecedents and consequences
- Practicing effective implementation of such skills.

Psychoeducation is one of the most crucial parts of ADHD treatments as it is also the root cause as to why many people fail to receive adequate treatment. Lack of knowledge on ADHD and how it affects the child is crucial to understand exactly what type of care the child needs to improve. However, many parents lack this basic knowledge, leading to failed attempts at behavioural management. Psychoeducation teaches parents about their child’s ADHD and how it is affecting them. Through this knowledge they will be able to seek out

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the best treatment option and navigate through the child's symptoms and problematic behaviours effectively.

In addition, through behavioural therapy the child along with parents, and teachers can learn techniques and skills from an experienced therapist. These can aid in improving the child's behaviour as parents and teachers use the techniques in their daily life to make everyday tasks more ADHD friendly. Psychosocial treatments are used since children with ADHD face problems in everyday life that go beyond the common symptoms. ADHD is a chronic condition, therefore whatever the child and their parents learn from behavioural therapy can be used and implemented throughout their life. Eventually these form into habits causing a natural change in behaviour with frequent implementation of the techniques learnt.

Cognitive training is an example of psychological interventions. Cognitive training is a type of memory training which incorporates adaptive schedules to strengthen the part of the ADHD brain which is deficit of basic neurological functioning.

COMPARITIVE EFFICACY OF PHARAMACOLOGICAL TREATMENTS AND NON-PHARAMACOLOGICAL TREATMENTS

Current clinical guidelines recommend an individualised multimodal treatment approach including psychoeducation, pharmacological interventions and non-pharmacological interventions. While pharmacological treatments target the root problem of ADHD, which is the low production of norepinephrine and dopamine. On the other hand, non-pharmacological treatments implement contingencies targeting the executive dysfunction, eventually aiming to provide children with ADHD skills and healthier habits that compensate for their ADHD deficits.

Moreover, numerous studies show that both medication and behavioural treatment are effective in improving ADHD symptoms. While medications are a great short-term treatments option, psychosocial treatments aid the child to function more efficiently in the long-term.

One must also consider other disruptive behaviour disorders such as tic disorder, Tourette's syndrome and substance use disorders (in which case using stimulants for treatment, becomes an unviable option). Treatment for ADHD is tailored to each individual based on their prior history, preferences and responses to different. While there is no one perfect treatment that can be applied for everyone, there are many ways in which the process of finding the best treatment for the child can be made easier.

Research Project

Purpose of Research

With the research I have conducted, I aim to contribute to the existing research present on possible treatment options for ADHD, while summarising the variety of options and possibilities available for children with ADHD.

METHODS

After going through several articles, and research papers of previous studies, I started to plan out my own study. In order to discover the most efficient treatment, I put together a survey with questions that gather both quantitative and qualitative data from clinical ADHD experts. This survey will help me gain the perspective of medical professionals that

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specialise in treating ADHD in children and adolescents. Along with the data collected from the survey I will use the information gathered from previous studies and literature reviews, I aim to reach a conclusion showing the most efficient approach to ADHD treatment for children and adolescents.

The questions in the survey were formulated to check the correlation between results from similar previous surveys. My survey primarily focuses on ADHD specialists' preferred type of treatment. In addition to this, I included queries about the primary symptoms often observed in their patients to see if the type of treatment preferred varies for the type of symptoms in the patient. The survey takes 10 minutes and consists of six sections. I made this survey with the help of Google Forms.

Before giving out the survey, I asked for consent from all the participants and ensured them that the results will be anonymous.

A copy of the survey can be found in the appendix

In addition to this, I have researched several different research papers all aiming to find the more efficient method of treatment for ADHD in children but differing in methods used. Using both the results obtained from my survey and results from previous research papers I aim to observe a correlation between them.

Data Analysis

Processed data: Primary

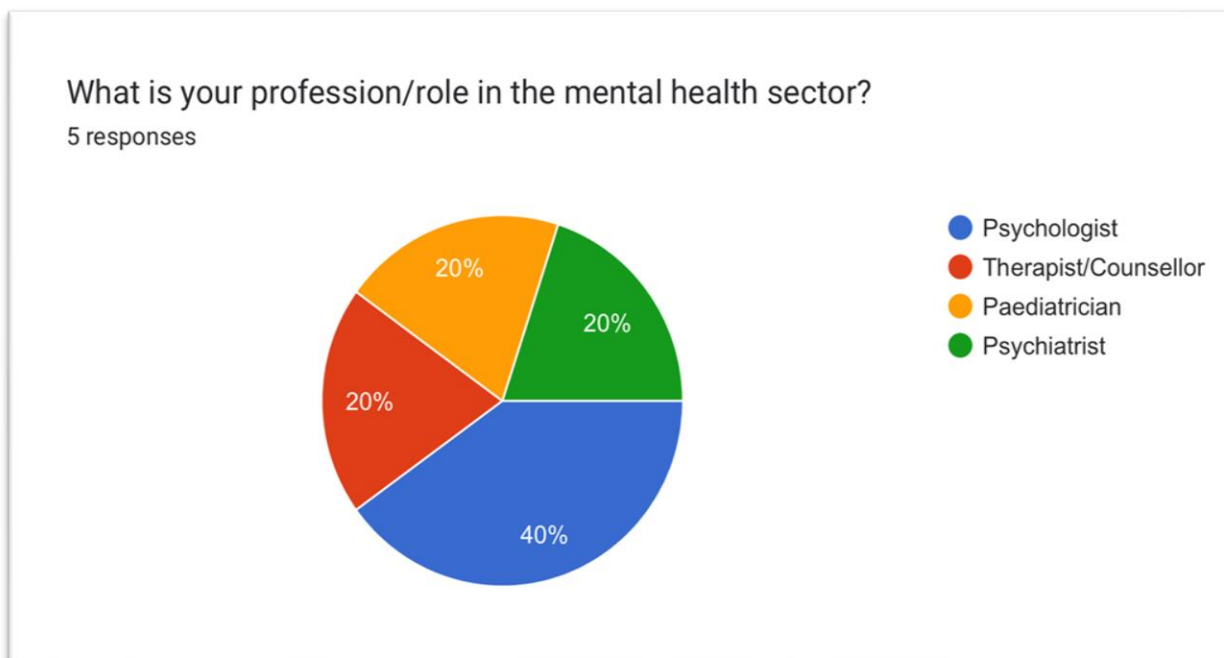


Figure 1: A pie chart depicting the ratio of participants' role in the mental health sector.

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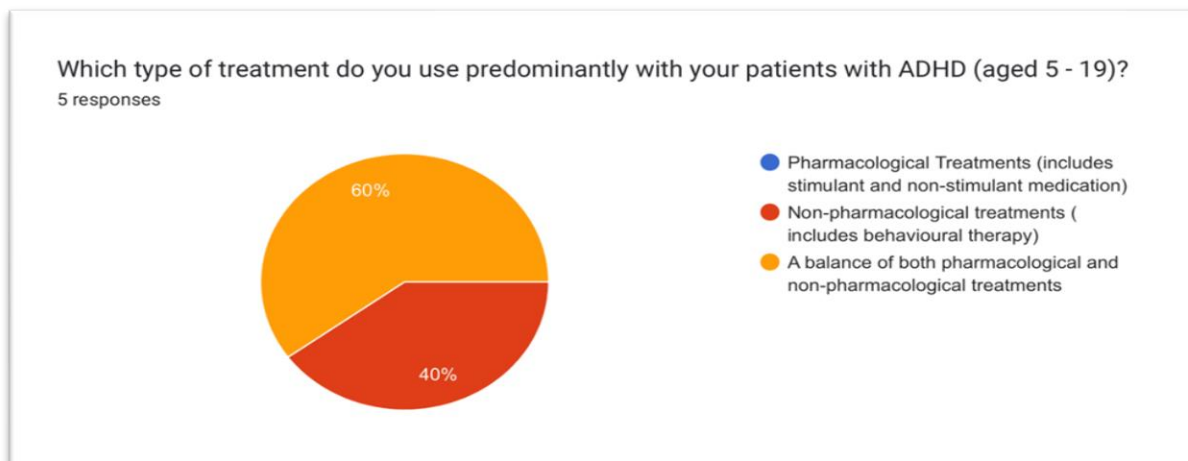


Figure 2: A pie chart depicting the ratio of treatments predominantly used by participants.

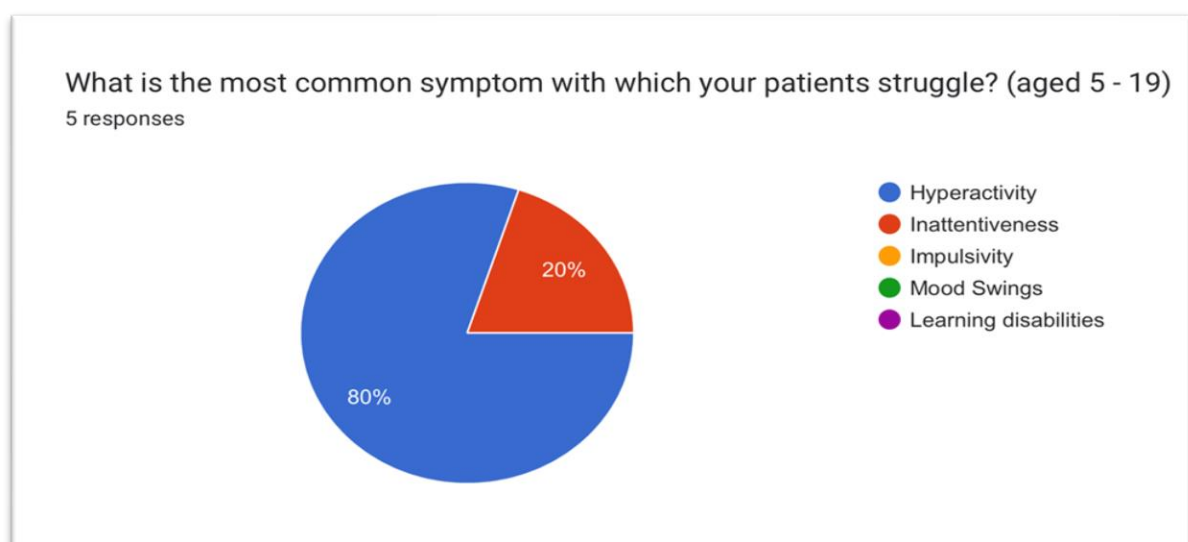


Figure 3: A pie chart depicting the ratio of symptoms most often observed in patients.

Pharmacological Treatments

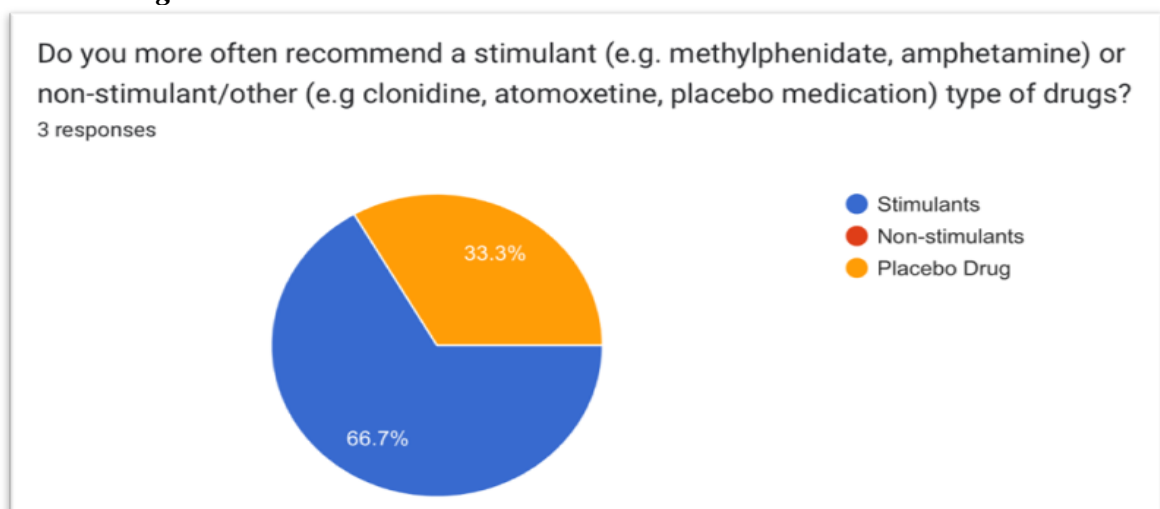


Figure 4: A pie chart depicting the ratio of participants that use certain pharmacological treatments.

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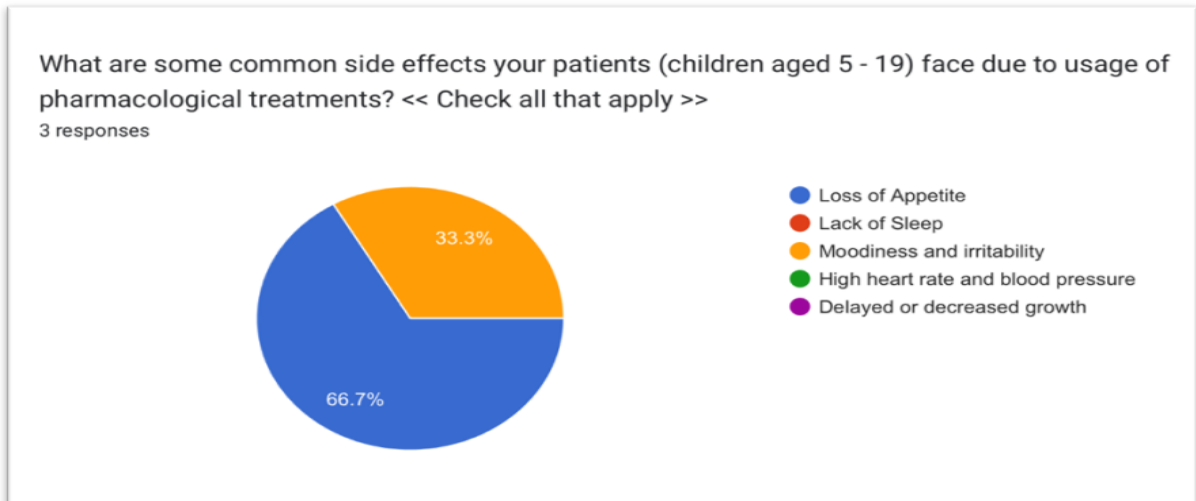


Figure 5: A pie chart depicting the side effects faced by patients due to usage of pharmacological treatments.

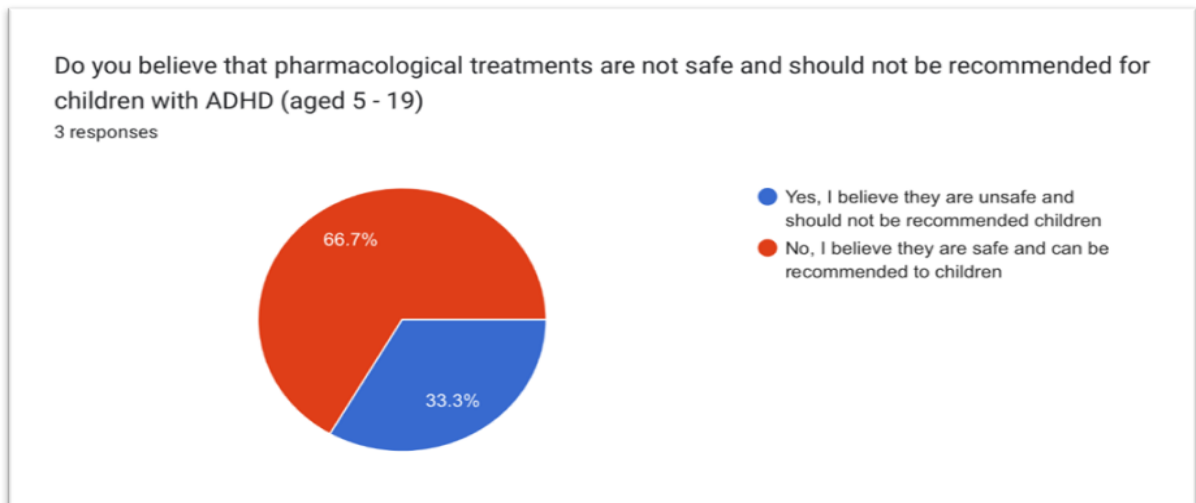


Figure 6: A pie chart depicting the ratio of average time taken to find the right pharmacological treatment for patient.

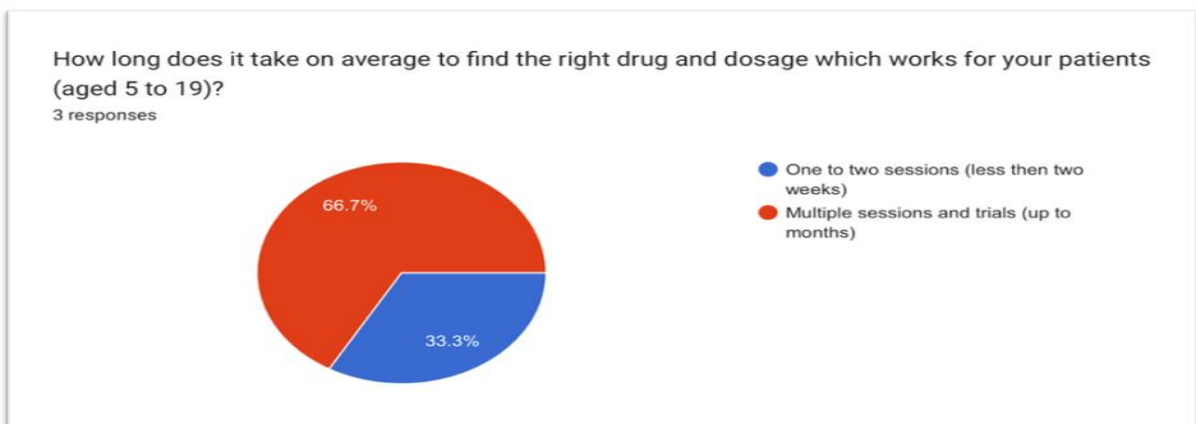


Figure 7: A pie chart depicting the ratio of participants opinion on pharmacological treatments.

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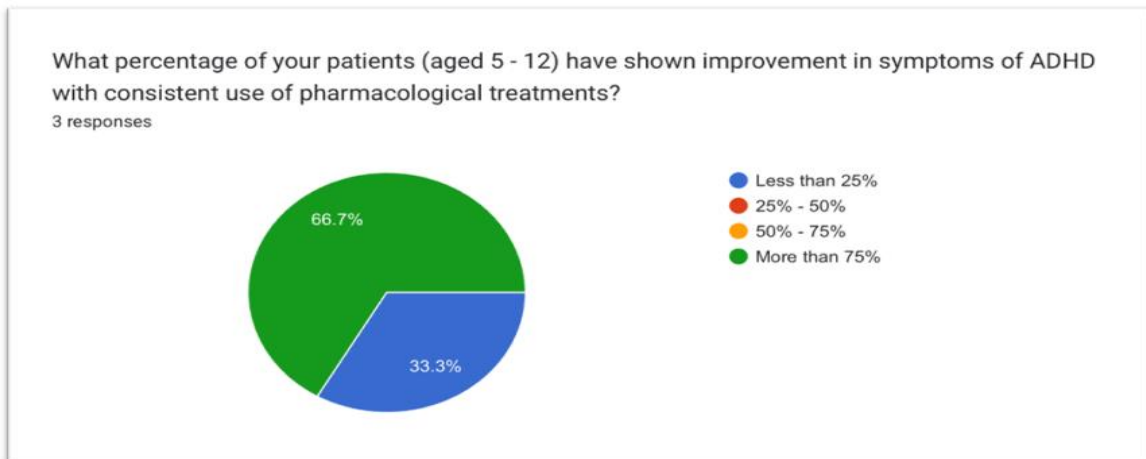


Figure 8: A pie chart depicting the ratio of average percentage of patients that have shown improvement in symptoms with consistent use of pharmacological treatments

Non-pharmacological Treatments

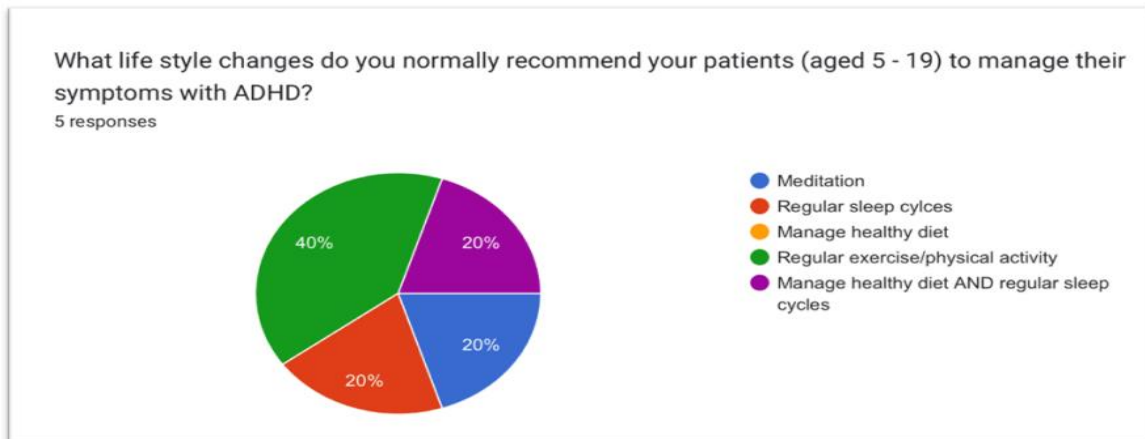


Figure 9: A pie chart depicting the ratio of the participants' recommended life style changes for their patients with ADHD

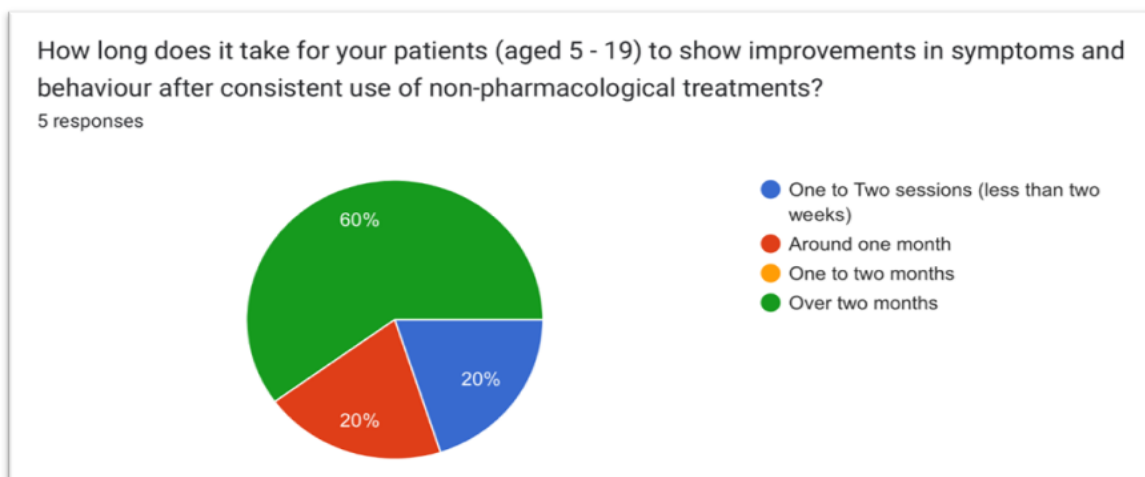


Figure 10: A pie chart depicting the ratio of the duration taken for ADHD patients to show improvement in symptoms with consistent use of non-pharmacological treatments

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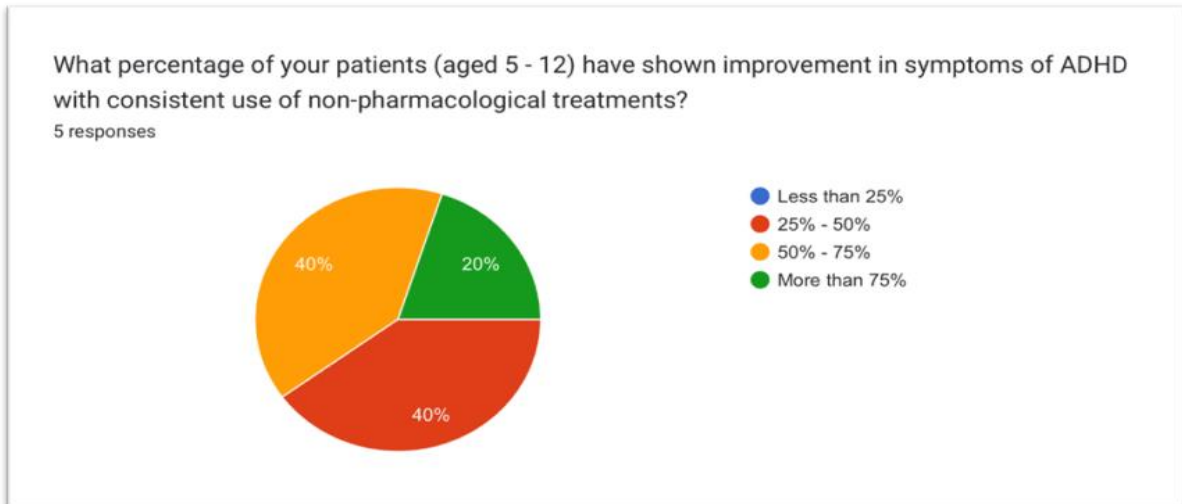


Figure 11: A pie chart depicting the ratio of the percentage of ADHD patients who have shown improvement in symptoms with consistent use of non-pharmacological treatments

Comparison of pharmacological and non-pharmacological treatments

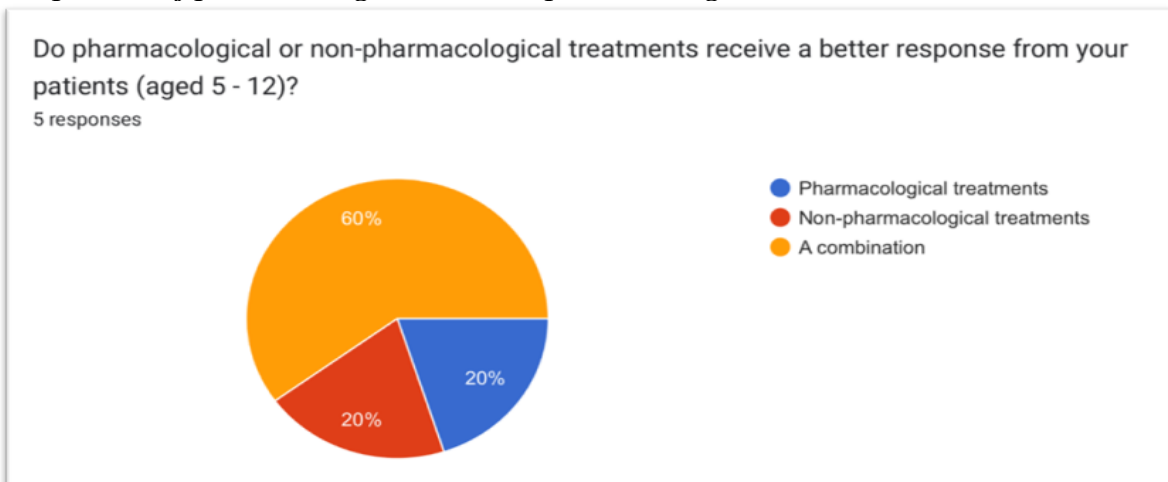


Figure 12: A pie chart depicting the ratio of treatments which receive a better response from participants' patients.

As an expert, which type of treatment do you feel is best for children with ADHD (aged 5 - 19)?

5 responses

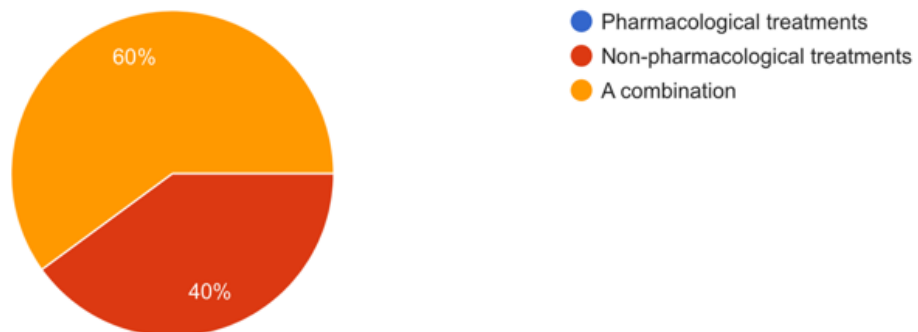


Figure 13: A pie chart depicting the participants' preferred type of treatment for children with ADHD

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Processed Data: Secondary

Research Paper 1: *Symptomatic improvement in children with ADHD treated with long-term methylphenidate and multimodal psychosocial treatment (Abikoff et al., 2004).*

The objective of this research was to test the hypotheses that when combined with multiple modes of psychosocial treatments, the methylphenidate drug will significantly improve symptoms of ADHD and ODD (oppositional defiant disorder). In comparison to using methylphenidate alone, overall functioning of the children should show improvements in children with ADHD.

Out of one hundred three children with ADHD (ages 7-9), one group was treated using methylphenidate alone, the second group was given methylphenidate along with psychosocial treatments. The modes of psychosocial treatments used included parent training and counselling, training social skills, psychotherapy and assisting the children academically. The third group was treated with methylphenidate and psychosocial control treatment.

The results of this experiment, showed that using a combination of treatments did not result in better functioning of the child. However, there was a significant improvement across all the treatment methods used which were continued over two years

In this experiment you can conclude that, in children with ADHD who respond to stimulants such as methylphenidate, addition of long-term psychosocial treatments to improve symptoms is unnecessary.

Research Paper 2: *A randomised controlled trial of cognitive behavioural therapy for ADHD in medication-treated adolescents (Sprich, Safran, Finkelstein, Remmert & Hammerness, 2016).*

The objective of this research was to use cognitive behavioural therapy to relieve symptoms of ADHD in medication-treated adolescents.

Out of forty-six adolescents with ADHD symptoms, twenty-four were randomly picked to receive cognitive behavioural therapy for ADHD, twenty-two to wait list control, and fifteen were crossed over from wait list to cognitive behavioural therapy.

The results were consistent throughout the sample size and showed that there was a greater proportion of adolescents who responded positively to the cognitive behavioural therapy. These group of adolescents were receiving medications for ADHD, and still continued to show persistent symptoms. This proves that for children who don't show improvement in symptoms while using medication, can be treated with cognitive behavioural therapy.

RESULTS

First, I will be analysing the results obtained in the survey.

60% of the participants said that they use a combination of both pharmacological and non-pharmacological treatments. 40% said they use only non-pharmacological treatments. None of the participants use pharmacological treatments alone, suggesting that medications alone are not the preferred treatment method. The more common choice of treatment plan preferred by the participants seems to be pharmacological treatments with non-pharmacological treatments as adjunctive therapy.

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80% of the participants claimed that hyperactivity is the most common symptom that patients struggle with. 20% claimed it to be inattentiveness while impulsivity, mood swings and learning disabilities were not the primary concern. However, it can be interpreted that learning disabilities are caused due to hyperactive and inattentive symptoms.

60% of the participants use pharmacological treatments to treat children with ADHD out of which 66.7% of them recommend stimulants, and 33.3% recommend placebo drugs. Non-stimulants were not recommended by anyone in the sample. This further proves the effectiveness of stimulants in comparison to the other types of drugs.

Loss of appetite seemed to be the side effect faced by most of the participants' patients, followed by moodiness and irritability. Lack of sleep, high heart rate and blood pressure and delayed/ decreased growth were not primary concerns suggesting that the side effects commonly caused by stimulants are ones that can be easily resolved. The more serious side effects that cause concern in most parents, leading them to avoid opting for pharmacological treatments even though they are extremely effective choices of treatment.

66.7% of the participants claimed that they believe pharmacological treatments are safe to be recommended to children, and also confirmed that more than 75% of their patients have shown improvement in symptoms of ADHD with consistent use. On the other hand, 33.3% believe they are unsafe for children and claim that less than 25% of their patients have shown improvement with consistent use. Since the sample size is low, the large proportion claiming that pharmacological treatments are not a good option for treating ADHD in children is not of big concern.

Now coming to non-pharmacological treatments, the participants all recommend a range of different lifestyle changes to their patients. This includes, 40% for regular exercise, 20% for meditation, 20% regular sleep cycles and 20% for both healthy diet and regular sleep cycles. The wide range in answers shows that life style changes are a matter of preference depending on the patient and what seems to be working for them.

With consistent use of pharmacological treatments, 60% of participants claim that it takes over two months to show improvements. 20% say that it takes around one month and 20% say it takes less than two weeks. The wide range of answers here also suggest that the time taken to show improvement is also dependent on the patient and the type of treatment they are receiving.

Furthermore, 40% of the participants have said that only 25% to 50% of their patients have shown improvement in ADHD symptoms with consistent use of non-pharmacological treatments. 40% have said that 50% to 75% of their patients have shown improvement and only 20% of participants said that more than 75% of the participants have shown improvement in ADHD symptoms.

In comparison to pharmacological treatments, non-pharmacological treatments seem to achieve a much lower response from patients. This further suggests that pharmacological treatments are a much faster-acting and effective method of treatment. However, the disadvantages of pharmacological treatments, mainly side effects caused by them, could outweigh their benefits for some.

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Looking at the survey, 60% of the participants believe that a combination of both pharmacological and non-pharmacological treatments receives a better response from their patients and feel that it is the best approach for children with ADHD. 20% find that non-pharmacological treatments receive a better response and 20% believe that it is pharmacological treatments. However, 40% of the participants agree that non-pharmacological treatments are the best option for children with ADHD.

Through these results, I have understood that while pharmacological treatments are highly effective and efficient, they are rarely used on their own. Non-pharmacological treatments are often used as adjunctive therapy treatments with pharmacological treatments, however the data collected from prior researches suggests that this is ineffective. The fact that many doctors and psychologists continue to recommend a combination of both therapies is because behavioural therapy often resolves the side effects caused due to pharmacotherapy; However, some still seem to believe that pharmacological treatments are dangerous for children. This seems to be significantly due to concerns regarding the side effects caused by them. Hence why, using solely non-pharmacological treatments is also a popular choice regardless of whether improvements in symptoms are shown or not.

CONCLUSION

With a survey and analysing the previous data collected from research papers, I was able to successfully answer my research question. Although in my survey it was proven that 60% of the ADHD specialists prefer to use a combination of both pharmacological and non-pharmacological treatments, through research data I found that using a combination of both treatments has little to no effect on children with ADHD who are responsive to stimulant treatments.

However, for children with ADHD that are not able to use stimulants or any other type of pharmacotherapy for their symptoms, psychosocial treatments such as behaviour management treatments, cognitive behavioural therapy have shown improvements in the symptoms. In addition to therapy, psychoeducation was proven to be a strong tool in improving the child's functional impairments caused by ADHD symptoms. Such type of non-pharmacological treatments were shown to be preferred by 40% of the survey participants.

When comparing the effects of pharmacological and non-pharmacological treatments, I observed that it is apparent that pharmacological treatments take effect immediately and target the symptoms at the problem site (lack of dopamine and noradrenaline) where as, non-pharmacological treatments take much longer to show improvements in symptoms and target the functional impairments caused by symptoms of ADHD. This results in the patients making behavioural and lifestyle changes to further accommodate for their symptoms and needs as someone with ADHD.

The research on ADHD treatments continues to expand as we find new ways that many patients struggling with ADHD use to cope with everyday. With this study, one can conclude that the most efficient treatment is dependent on the personal needs of the patient with ADHD and can differ significantly from one person to another.

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Evaluation

Here, I will explore the challenge that I faced when conducting this research and how I chose to overcome them, in order to obtain results of the maximum possible accuracy.

Method

Strengths:-

In the survey I incorporated questions that would give me definitive answers instead of descriptive answers which require extra analysis. This would make it difficult to present the collected data in a graph that's easy to decipher from the images inserted. I knew that the survey should also be easy and quick to answer while collecting all the information necessary for the research. Therefore, I made sure that most questions were multiple choice questions that were easy enough to comprehend.

I also took data from previous researches tackling a similar question. The methods used in the referenced papers were much different to my own. Both papers referenced tackle observed effects of medications and therapy on children with ADHD. This adds much credibility to the final conclusion.

By taking consent from every participant and by ensuring they remain anonymous, I have also considered the moral and ethical implications of the research study.

Limitations

The survey questions were repetitive and lengthy to read, therefore many participants would be unwilling to do it. However, I could not further compress the questions or the survey because I would lose imperative data. This resulted in a low sample size, which reduced the reliability of the results. The tests were shared online to specialists, however there was no way of checking whether they have received and acknowledged the request as most were unresponsive. Although I also attempted visiting many clinics and sites in my local area, I found few willing participants since ADHD treatment is not yet well established in my locality.

Sample

Strengths:

The sample consists of ADHD specialists who have studied and practiced the treatments I am researching for many years. Their first hand experience with patients is good for achieving a reliable conclusion. Moreover, they are professionals who have witnessed a range of patients of the ADHD spectrum. This gives my research more diversity in the type of treatments and symptoms evaluated, ensuring that my survey is not limited to one type of patient with only certain symptoms.

Limitations

Ideally, I would have liked to collect data from more specialists however the availability of ADHD children specialists is considerably low. It was a task to find the sample that I was able to get, after sending out the survey to several ADHD specialists in addition to visiting several clinics to physically hand out a survey. By having the low sample size, the accuracy and reliability of my results is reduced.

The survey primarily targeted ADHD specialists, who are not patients of ADHD themselves. Taking the opinion of patients with ADHD as to their preferred method of treatment which

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works best for them, while also considering their symptoms and other external factors would have given a greater insight into how different treatments work for different people. This would further improve the accuracy of my research and would allow me to occur at a stronger conclusion.

Results

Strengths:

The final result of the survey proved the 60% of ADHD specialists prefer to use a combination of both pharmacological and non-pharmacological medications. This supports my hypotheses that a combination of both shows greater efficacy than either one or the other.

Limitations

On the other hand, research data evaluated shows that using both pharmacological and non-pharmacological treatment has little to no effect on the patients in comparison with patients who use only pharmacological treatments and show improvements. This contradicts my hypothesis. The contradiction could be a result of low sample size and low diversity in the sample size.

Reflection

As someone that has experienced and witnessed many people with ADHD struggle to get through day-to-day life and tasks, the journey that this research took me on has led me to see a brighter path for the future. I was astounded at how little people that both do and don't struggle with this disorder know about exactly how it impacts their lives in a significant manner. I realised that this is one of the main reasons as to why many children and their parents both of whom are unknowing of their disorder, faces many challenges in finding the right treatment.

Through my research I aimed to achieve a conclusion which suggests the right way to approach treatment for ADHD to make the lives of these families easier. Initially, I had believed that there was a perfect treatment approach which could be used for every child with ADHD however after months of research I believe differently. ADHD is a spectrum which is displayed differently on different people. While some display hyperactive behaviours, others display more impulsive and inattentive behaviours. These different behaviours have different effects on the person and the environment surrounding them, therefore they need different treatments accordingly.

Towards the end of my research, I reached a point in which I understand that there isn't a perfect one box fits all treatment for ADHD. ADHD looks different in different types of people as not everyone suffers with the same symptoms or severity. The perfect treatment for each different ADHD patient is dependent entirely on them.

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Conflict of Interest

The author(s) declared no conflict of interest.

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