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ADHD TREATMENT: FROM MEDICATION TO BEHAVIORAL THERAPIES- A SYSTEMATIC REVIEW

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ABSTRACT

Introduction: Nowadays, ADHD is one of the most common diagnoses in the mental health field. It presents a wide spectrum of clinical presentations that affect patients' everyday life. Variety of symptoms make each patients' needs individual, and because of that, treatment of ADHD must be adjusted to each person separately to achieve the best possible outcome.
Materials and methods: This article, based on a PubMed review of available research, examines ADHD treatment
Key findings and conclusions: Options in first line medications are limited, therefore formulation technologies are one of the few methods to modify the therapy. Alternative to that, especially for patients that cannot take stimulants, are non-stimulant medications generally used in other medical fields. Additionally, psychotherapy is inherent for patients to understand their disorder, which allows them to accept it. The aim of this article is to present the basis of a complex issue, as ADHD treatment is.

KEYWORDS

ADHD, Stimulants, ADHD Therapy, ADHD treatment

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Introduction

Attention deficit hyperactivity disorder (ADHD) is a complex neurodevelopmental disorder that can affect individuals across the whole lifespan. Studies show that most ADHD cases are caused by environmental and genetic origins accumulation. Most recent meta-analysis states that ADHD is one of the most frequent neuropsychiatric disorders, and affects up to 2–4% of adults. According to the World Federation of ADHD International Consensus Statement prevalence of ADHD in children and adolescents ranged even from 5.9 up to 14%. Some reviews suggest geographic variations in the prevalence of ADHD, for example, two meta-analytic systematic reviews by Cenat and colleagues conducted on children and adolescents in America shows ADHD presence were 15.9 % in Black Americans, 16.6 % among Whites, and 12.4 % among Asians.

Clinical presentation may differentiate between age, sex or simply between each case which makes diagnosis extremely challenging. It requires a licensed clinician and involves not only patients, but also their caregivers. It is not possible to diagnose ADHD basing on scales, tests or brain imagining methods only, therefore it has been criticized as not objective enough.

Needless to say, ADHD impairs the lives of patients and their families- not only emotionally. Studies show ADHD patients are more likely to to be convicted of criminal offenses, have greater risk of accidental injuries and their risk of premature death and suicide is significantly higher than in the rest of population. For those reasons ADHD costs society hundreds of billions of dollars each year, worldwide.

All of these reasons make ADHD treatment a very important and complex issue nowadays. Due to a variety of symptoms, personalized treatment is essential to achieve long-distance results [1-6]

Material and Methods:

Review of medical research and articles published on PubMed

1. Pharmacological Treatment

1.1 stimulant Medications

Although one universal therapy for ADHD is nonexistent due to its complex etiology, various clinical symptoms and coexistent diseases, stimulant medications are the first-line choice in treatment. Selectable options in this group of medications are limited to methylphenidate and amphetamine, but there are several formulations that may impact pharmacokinetic profile of those substances. The main issue with stimulants is its short duration of action that causes requirement of multiple doses each day. Various medication delivery technologies affect stimulants' levels in blood. Clinical effect depends strictly on plasma levels of medication, so the main goal to achieve is a consistent level of drug release, with rapid onset and gradual offset of action. Additionally, fluctuations in drug levels in blood may conduct side effects or reduce potential benefits.

The first delivery technology developed to lengthen clinical effect was osmotic release. In effect of water absorption during passage in the gastrointestinal (GI) tract, medication is gradually revealed from multiple chambers at different times. This technology successfully extends the duration of efficiency. Another option uses differences in pH levels in the GI system to release the drug from multiple beads in one capsule. Third technology, prodrugs, consists in oral intake of inactivated medication that uses endogenous enzymes to release active stimulant. Those processes are gradual which enables slow release of active ingredients. However, tablets or capsules must be swollen whole and cannot be taken by patients with gastrointestinal tract narrowings. Additionaly, dosage of each release is not equal and the period of release cannot be controlled precisely due to patients' personal differences, such as lifestyle, diet etc.

An alternative to oral formulations is transdermal delivery. This method was created especially for patients who cannot or prefer not to swallow pills (eg children), however, it is limited by the delayed onset of efficacy and the drug patch itself may irritate the skin. Therefore, ion-exchange resins, the dissolved stimulant salts, may be an alternative for patients with GI issues that do not tolerate patches. This technology allows more approachable oral formulations, such as liquids, oral dissolving tablets (ODTs), and chewables. Similarly to other oral formulations, effectiveness of treatment can be altered by diet and lifestyle.

Clinicians must consider patients' individual needs for therapeutic onset and combine a variety of stimulants formulations to personalize the treatment. Universal therapy is impossible to achieve, not only because of diversity in clinical picture in ADHD patients, but also because of drug misuse. Some recent meta-analyses show that stimulants misuse is associated with high risk of adverse events, especially in patients with other mental disorders, which are common to ADHD diagnosis. Therefore, non-stimulants treatment is recommended as complementary to stimulants [7, 8].

1.2 Non-Stimulant Medications

Stimulants are not sufficient in every case, therefore, nonstimulants are often crucial to execute the best possible quality of life for patients. Nonstimulants can be used either in monotherapy or as an adjunct to stimulants in ADHD treatment. Besides that, they are generally recommended in patients with insomnia, low weight or anxiety, as stimulants may develop or intensify those symptoms. They can also be used as an augmentation strategy when maximum dosing of stimulants has only partial response.

There are three groups of nonstimulant medication for ADHD: norepinephrine reuptake inhibitors (eg. atomoxetine, viloxazine), alpha agonists (eg. guanfacine, clonidine), and other medications used as off-label third-lined options (eg. bupropion, tricyclic antidepressants, polyunsaturated fatty acids). The first nonstimulant drug approved for ADHD is atomoxetine. Aside from placebo, it improves reaction time, attention, impulsivity and working memory, even though, in contrast to methylphenidate it has no effects on working memory. Chronic methylphenidate and atomoxetine usage have comparable effects of improving cognitive domains. Alas, studies show limited response to atomoxetine in up to 40% of patients, which makes a gap that needs to be filled with another substance. Viloxazine is the newer drug. Randomized controlled trials show promising clinical effects in children and adolescents, however, due to its impact on serotonin receptors, risk of anxiety and mood changes is higher than in other nonstimulants. Guanfacine is a common nonstimulant used in ADHD patients in the US. In monotherapy it improves most of the symptoms, including impulsivity, inattention and hyperactivity and has no serious adverse events.

On average, nonstimulants have a lower size effect than stimulants, therefore should be considered mostly in patients that do not tolerate stimulants or choose not to use them. Studies show that all investigated nonstimulants were more effective than placebo, however their tolerability was worse. Combination of both of those drug groups seems to be the most efficient way of treatment considering not only its chemical effect, but also the ability to customize treatment for every individual patient and their needs. [9-14].

2. Psychological Treatment

Psychological therapy may be considered as an essential component in ADHD treatment, as the optimal care should integrate psychological and social factors besides medications, especially in younger patients. Therapy enables its participants to understand the differences in their usual functioning compared to neurotypical individuals and learn how to manage their everyday difficulties by controlling behavioural problems, like impulsivity. Another purpose is to teach patients how to motivate and sustain attention, self-regulate and control emotions. In addition, psychological treatment seems to enhence response to medications. Due to ADHD characteristics, all the acquired skills must be repeated and reinforced multiple times to enable patients to make use of it afterwards.

ADHD characterization is established on cognitive behavioural theory, therefore Cognitive Behavioural Therapy (CBT) is the most evidence-based non-pharmacological treatment option. CBT is widely supported as an effective treatment across all age groups. CADDI protocol is a type of CBT created especially for patients with ADHD-I (predominantly inattentive). Skills training in CADDI puts emphasis on planing activities, initiating and terminaing tasks. In result, participants reported increased understanding and acceptance of their condition and enhanced attention.

Meta-analyses of CBT in adult ADHD patients show greater reductions in symptoms in comparisons with no-treatment control groups and small effect in comparison with groups that benefit from psychoeducation, supportive therapy, clinical management and relaxation. CBT shows effectiveness both in core ADHD symptoms and emotional problems, When combined with medications it shows greater effectiveness than CBT alone, especially at the beginning of ADHD treatment, whereas it did not outcome medications alone. It has to be emphasized that CBT is effective for adults with ADHD with or without medications, and is most beneficial when combined with other psychological methods and medications.

Psychosocial treatment may be also based on mind-body regulations (physical activity, mindfulness) or parent-training and school- or community-based training, with best effect in the school-aged ADHD population. In parent-child therapy, caregivers learn how to recognize problematic behaviors and how to act to discourage those and reward positive ones. School- and community-based training is very important due to the fact that up to 50% of ADHD children face problems in social relations with peers- those types of therapy helps children to improve their social skills. It is still discussed if this kind of therapies actually improve ADHD symptoms or behaviour only, still- its effect enables patients to improve social functioning in every-day life.

Plenty of psychological treatment options are not studied enough to state if they are beneficial during ADHD therapy. Studies suggest that Mindfulness-based Cognitive Therapy (MC) in adult patients with no associated mental illnesses may be as effective as CBT, therefore it can be used as first-line psychological treatment for those, improving attention mostly. Meditation-based therapies have moderate effects on ADHD symptoms in children, especially preschoolers, but might help adults. Biofeedback and other mind-body interventions, like yoga, Tai chi or hypnotherapy, may seem to benefit some patients, but are not studied well enough to verify if they truly are. However, as it was mentioned earlier, they improve effectiveness when combined [15-25].

Results and Conclusions

Despite the high prevalence of ADHD in populations all over the world its treatment is still underdeveloped. There’s only a few registered medications, which makes it especially difficult for specialists to customize the treatment for each patient, especially considering vast diversity in clinical presence. Studies on large clinical groups are needed to explore all the nuances of ADHD treatment and create clear guidelines for specialists.

Lack of clear evidence-based recommendations on psychosocial approaches in ADHD therapy creates a huge need for more research. Existing therapeutic interventions may not benefit in all of the groups of patients. Generally, psychosocial treatment has a moderate effect on core ADHD symptoms, but helps the patients to learn how to manage them.

The crucial issue right now, as it was said repeatedly before, is to consider each patient's individual needs and try to meet them.

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