METHYLPHENIDATE: PRESCRIBED OR INDISCRIMINATE USE?

SAMARA CHRISTINA FRANÇA E **MELO**[1], SHARIZE BETONI **GALENDE**[2*]

1. Undergraduate student of Pharmacy, Faculty Ingá; **2.** Assistant Professor, MSc, graduate course in Pharmacy, Faculty Inga.

* Rodovia PR 317, 6115, Maringa, Parana, Brazil. ZIP CODE: 87034-510. sharizeg@yahoo.com.br

Received: 09/01/2015. **Accepted:** 09/09/2015

ABSTRACT

Methylphenidate is the substance most frequently used to treat the Attention Deficit and Hyperactivity Disorder ADHD, which is characterized by low production of catecholamines and trouble of children and adults in modulating attention. However, it also be confused with ADHD disorders of learning programs, thus giving an erroneous diagnosis and unnecessary use of the drug. Thus, due to their psychostimulant properties, using methylphenidate has been indiscriminate, used mainly to increase the borderline intellectual yield of university, businessman and health professionals. Another bad drug use is done by mothers and educators who want to calm the student in the classroom and at home, in order to increase the concentration. The indiscriminate use and not related to ADHD, can lead to serious side effects and also to the future problems for the child, as a possible reduction in the height or a level of malnutrition due to reduced appetite associated with the drug. Another high risk of excess methylphenidate use is the case of dependency that may cause a drug overdose.

KEYWORDS: Methylphenidate, ADHD, indiscriminate use.

1. INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is defined being, children and adults with difficulties to modulate attention, control impulsiveness and lack of an appropriate motor activity[1]. The cause of ADHD may be due to the low production of catecholamines and affected individuals do not have a suitable behavior as people with normal nervous system[6].

ADHD may be confused with the diagnosis of several other types of disorders, so the importance to differentiate them[3]. Some disorders easy to confuse are the Learning Disorders, which is when the child does not follow the learning level considered normal for their age age[1].

Learning disorders are divided into three: Reading disorder characterized by the inability to identify words out of context. Calculation disorder that is characterized by low yield in arithmetic. Finally, the writing disorder characterized by ugly letter and a difficulty at times requiring the writing[3].

People who have ADHD and together learning disorder, may show changes that profoundly affect normal aspects of daily life.

To treat ADHD drug methylphenidate is indicated, which acts as a stimulant of the central nervous system[14]. However, before discovering the diagnosis of ADHD, its indication was for the treatment of narcolepsy, but now the drug has been widely used for purposes not therapeutic, such as cognitive enhancement of people who do not have criteria for diagnosing ADHD and not Narcolepsy, leading to a series of controversies and discussions about the indiscriminate use of this drug[13].

The indiscriminate and non-prescribed use of methylphenidate is carried out mostly by university, entrepreneur and health professionals, who have a better knowledge about it and know of its benefits of increased productivity at school, and professional[16].

What is being brought into question is the problem of this indiscriminate use in relation to excess, starting simply and over time increases the doses[12]. This dose escalation and its non-prescribed use can lead to side effects of short and long term [20].

Short-term effects may include decreased appetite, which can lead to problems that are more serious as, insomnia, abdominal pain and headache. Since the long-term effects are dependency, cardiovascular problems and a possible decrease in height. Some of these effects may be dose-dependent, namely common symptoms associated with ADHD, and that can decrease or disappear with time and dose reduction[20].

2. MATERIAL AND METHODS

Through literature about not prescribed and indiscriminate use of methylphenidate, we write this article, which corresponds to a literature review. The overall objective of this article is to approach about methylphenidate being used irrationally and that does not fit the diagnosis of ADHD, as well as its side effects in relation to this indiscriminate use.

The research for the literature were held in virtual libraries as Google Scholar, Scientific Search Engine

(Scirus), Scientific Library Online (SciELO), Virtual Health Library (BVS-LILACS), EBSCO host. The searches were carried out using the indicators ADHD, Methylphenidate, Ritalin® side effects, Indiscriminate use, resulting in 21 articles used, which were relevant to the construction of this article.

3. LITERATURE REVIEW

The term Deficit Disorder Attention Deficit Hyperactivity Disorder (ADHD) is defined according to the Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition (DSM-IV) as children and adults unable to modulate attention, control impulsiveness and lack of motor activity adequate[1].

ADHD can occur because of a mixture of genetic, neuropsychological and biological, genetic being the most common. During pregnancy and childbirth, the child's exposure to various chemicals may be related to ADHD[2].

Studies show that ADHD is an inherited genetic dysfunction of prefrontal cortex due to a deficiency of the neurotransmitter dopamine, that this disorder characterized by frequent symptoms of inattention, impulsivity, hyperactivity, disorganization and social disability[3].

The attention span of children's development can be a signaling feature. Children 1-2 years has less attention, however normal and which are slowly acquiring a greater focus on activities. However, it should be alert when the time is too short attention. The hyperactive behavior is associated with a rapid curious about other situations and objects, excessive trading of interest, causing the child to mobilize to reach them[4].

Hyperactivity and impulsivity may follow different lines of thought. Hyperactivity corresponds to exaggeration or excessive motor activity in children. Already expressed by sudden emotional reactions and the child's impulsivity, reflecting a thoughtless and sudden reaction[3].

ADHD can be caused by low production of catecholamines and affected individuals cannot moderate their attention, their activity levels, their emotional impulses or their responses to stimuli in the environment as people with normal nervous systems[5].

Research shows that the problems of academic performance and learning disorders are more common among people with ADHD with attention deficit dominance[6]. Some important work documenting the cognitive and behavioral problems associated with ADHD, even if it is difficult to distinguish whether the deficits are associated with ADHD exclusively or with other comorbid changes with the problems that have adults with ADHD and Learning Disorder (LD). There are changes in executive functions in the central nervous system area where so-brepõem or intertwine both disorders. Due to this reason there is the importance of differentiating the various types of inconvenience to not confuse them[3].

Learning disorder

When the child does not acquire school instrumental skills, according to their age, despite having possessed adequate opportunities to learn and normal learning ability. Is not defined as learning disorder when there is a neurological disorder, mental deficiency or absence of schooling[1].

The learning disorders are classified into Reading Disorder, Calculation Disorder, Writing Disorder.

Reading Disorder

The reading disorder (RD) is when a child does not learn to read despite having a sensory capacity, normal cognitive and learning opportunity properly. It is characterized by the inability to identify words out of context; the cause may be a deficit in the phonological processing[3].

Clinical and epidemiological studies demonstrate that ADHD, learning disorder and in particular the reading disorder not relate to each other, are independent of each other. The reading disorder is defined by the presence of deficit in the phonological and language processing[7].

ADHD and RD can appear in the same person, however, must be evaluated and diagnosed separates alia, in ADHD is the diagnosis taking into account behavioral manifestations. Already in the RD criteria of diagnosis are made on the basis of deficits in cognitive processes. Children with ADHD and RD have deficits in executive functions and tasks that require a phonological processing[8].

Calculation disorder

The calculation disorder is diagnosed when the yield in arithmetic comes in below the expected level according to the child's age. May interfere with an academic performance or even in activities of daily living that require certain skills[1].

This type of disorder is related to two types of problems: related to memory and related procedural skill[3].

Writing Disorder

In this disorder there is usually a combination of lack of ability to compose written texts, evidenced by errors in grammar and punctuation within sentences, poor organization of paragraphs, multiple misspellings or poor handwriting, in the absence of other losses in written expression[9].

The main feature relating ADHD in the literature is the ugly letter and a difficulty that requires writing[10].

Compared to students without the writing disorder,

approximately 50% of students with writing disorder drop out. Most likely to drop out of school are in prior even early years in the university bachelor[11].

Aman *et al*. (1998) developed strategies for ADHD evaluation, aiming to be the important information provided by parents or caregivers who have the disorder as: current problems of personal development, schooling[3].

Some more common symptoms later in life who have ADHD are grouped into four categories: 1- Cognitive: difficulty concentrating, confusion; 2- Problems to control the behavior: poor discipline; 3- Problems at work: income below capacity, difficulty of finding a job; 4 Changes in mood: depression, anxiety, low self-esteem[11].

People who have both ADHD and the learning disorder may have more profound changes that can affect aspects of daily personal life[3].

Methylphenidate

The methylphenidate is a drug derived from piperidine, which, like amphetamine, acts as a stimulant of the central nervous system by activating the excitation system mainly in the prefrontal cortex in limbic regions and striatum, increasing extracellular dopamine concentration by inhibit catecholamine receiving this through their respective carrier[12].

Methylphenidate mechanism of action consists in stimulating alpha receptors and beta-adrenergic directly, or release of dopamine and noradrenaline the synaptic terminals, indirectly[13].

Initially it was an indication of methylphenidate for the treatment of narcolepsy, a rare disorder of sleep, but other studies have begun to highlight the benefits for the treatment of hyperactive children and distracted. Today its main indication for therapeutic purposes is for the treatment of ADHD in children[14].

Methylphenidate, whose main trademark is Ritalin®, has been widely used for non-therapeutic purposes as cognitive enhancement of people who do not have criteria for the diagnosis of ADHD, thus raising a number of controversies regarding its indiscriminate use that is expanding gradually and can be a big problem of public health[13].

A predominant factor in the strong growth of the "misapplication" of the drug is their relation to the diagnosis of ADHD[15].

A concern of the National Health Surveillance Agency (ANVISA) is the inappropriate use of indiscriminate of methylphenidate hydrochloride. For this reason ANVISA suggested a follow-up of the drug in Brazil. This monitoring is conducted in partnership with the Pharmacy Council to raise awareness of pharmacists and prescribing this drug, aimed at rational drug use in states where there is a greater demand for this substance[15].

Pharmacy and Medical Councils should go into a consensus that the drug can have serious consequences for the future and raise awareness about its correct use[16].

The indiscriminate use of methylphenidate is largely made up of university, business and health professionals, to be associated with increased productivity (academic and professional). Usually these users have a deeper understanding about the drug[17].

According Buchalla (2004), hyperactivity was once considered an only child badly, now became also detected in many adults and methylphenidate drug for these cases is a major breakthrough. However, the big problem is the dark side of the drug, ie the excess. Many parents use the drug to leave the quieter children and to stop them with drugs[18].

The indiscriminate use of methylphenidate begins simply and with the passage of time, the person starts using increasing doses, tolerance increases and this leads to higher consumption. The big problem is that very high doses of the substance can lead to convulsions, headaches and hallucinations[12].

Other adverse effects of methylphenidate are short and long term. The short-term side effects observed prevailed decreased appetite, insomnia, abdominal and headache pain, but in patients who already make continued use of the medicine frequent symptoms can be associated with ADHD, these effects are dose-dependent and may disappear or decrease with time and dose reduction[19].

Regarding the reduction of appetite is noteworthy that associated with the drug a high calorie diet and multivitamins to compensate for weight loss and low food intake is required. Another factor that may also compromise the food is abdominal pain associated with reduced appetite in this case is necessary to reduce the dosage of the medicine and always take with meals. Regarding the headache, a way to get around it is associated with use of painkillers. To avoid insomnia should avoid the use of medication to sleep next time[20].

The main long-term side effects include addiction, cardiovascular effects and possible reduction of stature. The dependence is because patients achieve wellness and benefits with the use of methylphenidate, including increased alertness and concentration to perform daily tasks, it can also lead to an overdose of the drug[21].

Regarding the reduction of stature, a study are being conducted to see if stunting is related to medicine or is it a feature of the disorder itself, but there is still nothing conclusive on the subject.

The most common symptoms in cases of overdose include agitation, seizures, hallucinations, psychosis, lethargy, dizziness, tachycardia, hypertension and hyperthermia. Clinical manifestations that can be treated with benzodiazepines, antipsychotics, calcium channel blockers, alpha-adrenergic antagonists, and in the case of solid oral intake cause gastric lavage[21].

4. CONCLUSION

The ADHD disorders that affect the attention and concentration of children and adults and can be confused with several other disorders are diagnosed through rigorous criteria and its treatment is done using the methylphenidate drug, also known as Ritalin®. The methylphenidate advantages with respect to increased attention and concentration and well-being, can lead to indiscriminate and excessive drug, which can cause serious side effects. The big problem is that methylphenidate is being used by professional and college, not being associated with the diagnosis of ADHD, but the use is not prescribed and the search for the advantages that the product offers.

Therefore, it is concluded that the lack of knowledge, or knowledge in excess, relative to the drug and its side effects, together with the quest for an increase in efficiency and a sense of well-being, leads to indiscriminate and nonprescription of methylphenidate may cause future problems in children and even in adults. Often the constant propaganda that methylphenidate calms children can induce educators and responsible for the child to press doctors to prescribe methylphenidate, which could result in a diagnosis outside the box it would take for ADHD.

Through studies and discussions on the subject observed the need for the use of methylphenidate be narrower; the liberation of the drug to the patient must be done rigorously, if attesting that the patient really fits the clinical standards required for treatment with methylphenidate.

REFERENCES

[01] Pereira American Psychiatry Association. Diagnostic and statistical manual of mental disorders (4ed.) Washington DC. 1994.

[02] Barbosa GA, Gouveia VV, Barbosa AAAG. Factores predisponentes da síndrome hipercinética: Um estudo retrospectivo. In: Revista de Neuropsiquiatria da Infância e Adolescência. 2000; 8.

[03] Freitas M. Lucinete; Tiedemann. Transtorno do Deficit de Atenção e Hiperactividade: uma perspectiva compreensiva. 2006.

[04] Smith EE & Jonides J. Neuroimaging analyses of human working memory. Proceedings of the National Academy of Sciences (USA). 1998; 95:12061-68.

[05] Faraone SV, Biederman J, Weiffenbach B, Keith T, Chu M.P, Weaver A, Dopamine D4 gene 7-repeat allele and attention-deficit/hyperactivity disorder. Am J Psychiatry 1999; 156:768-70.

[06] Cohen NJ, Vallance DD, Barwick MIMN, Menna R, Horodezky NB, Issacson L. The Interface Between ADHD and Language Impairment: an examination of language, achievement, and cognitive processing. Journal of Child Psychology and Psychiatry. 2000; 41.

[07] Tannock R. Attention-deficit/hyperactivity disorder: advances in cognitive, neurobiological, and genetic research. J Child Psycho Psychiatry. 1998; 39:65-99.

[08] Shaywitz BA, Pugh KR, Jenner AR, Fulbright RK, Fletcher JM, Gore JC, & Shaywitz SE. The neurobiology of reading and reading disability (Dyslexia). In M.L.Kamil, P.B. Mosenthal, P.D., Pearson, & R. Barr (Eds.). Handbook of reading research. 2000; 229-49. Mahwah NJ: Erlbaum.

[09] Salvatore Mannuzza, Ph.D., Rachel G. Klein, Ph.D., Abrah Bessler, M.A., Patricia Malloy, B.S.W., and Maria LaPadula, Ph.D. Adult Psychiatric Status of Hyperactive Boys Grown Up. 1998.

[10] Webster M, Ungerleider LG. Neuroanatomy of visual attention. In: Parasuramn, R. (ed). The Attentive Brain, Massachusetts, A Bradford Book. 1998; 27.

[11] Levy F, Hay D, Mclaughlin M, Wood C, & Waldman I. (1996). Twin-sibling differences in parental reports of ADHD, speech, reading and behavior problems. J Child Psychol Psychiatry. 1996; 37(5):569-78.

[12] Brunton LL, Lazo JS, Parker, KL. Goodman & Gilman - As Bases Farmacológicas da Terapêutica. 11ª Edição. Rio de Janeiro: McGrawHill. 2007

[13] Shirakava DM, Tejada SN, Marinho CAF. Questões atuais no uso indiscriminado do metilfenidato. Omnia Saúde. 2012; 9(1):46-53.

[14] Ortega F, et al. Ritalin in Brazil: production, discourse and practices. Interface - Comunic. Saúde, Educ. 2010; 14(34):499-510.

[15] Lino RLAT. Distúrbio do déficit de Atenção. Lisboa Portugal, Jan. 2005.

[16] Leite GE, Baldini FLN. Transtorno de déficit de Atenção/Hiperatividade e Metilfenidato. Uso Necessário ou induzido? São Paulo, out. 2008.

[17] Brant LC, Carvalho TRF. Methylphenidate: medication as a "gadget" of contemporary life. Interface - Comunicação, Saude e Educação. 2012; 16(42):623-36.

[18] Buchalla PA. Saúde: ritalina, uso e abusos. Veja online. São Paulo,27 out. 2004.

[19] Efron D, Jarman F, Barke M. Side Effects of Methylphenidate and Dexamphetamine in Children with Attention-Deficit Hyperactivity Disorder: A double-blind, crossover Trial. Pediatrics. 1997; 100(4):662-6.

[20] Barkley RA, Mcmurray MB, Edelbrock CS. ET AL. - Side Effects of Methylphenidate in Children with Attention Deficit Hyperactivity Disorder: a Systemic Placebo-controlled Evaluation. Pediatrics. 1990; 6(2):184-92.

[21] Klein-Scharwtz W. Abuse and Toxicity of Methylphenidate. Curr Opin Pediatr. 2002; 14(2):219-23.