

Treatments for children with ADHD: comparative study of the effectiveness of atomoxetine versus omega-3 in children monitored at the psychiatry department of Tlemcen University Hospital

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Abstract:

To lessen the symptoms of attention deficit disorder and enhance the quality of life for children with or without hyperactivity, a diagnosis and treatment plan is necessary. For children older than six, atomoxetine is the first non-stimulant drug available. It is only one component of treatment; other children may also benefit from more natural remedies, such as Omega 3. Thus, the following is the issue: Is atomoxetine a better dietary supplement than those based on Omega 3? Is it possible for atomoxetine to effectively reduce symptoms of attention deficit disorder, whether or not hyperactivity is present? Is Omega 3 a good enough substitute for methylphenidate in youngsters with hyperactivity? In order to address this, a prospective observational study was conducted at the psychiatry department of Tlemcen University Hospital in Algeria for duration of twelve months. The study had a comparative aim and used the Conners scale for parents. The sample of sixty children with ADHD was divided into two groups. The first before and after taking atomoxetine, and the second before and after using Omega 3, depending on the parents' preference. The study's finding suggests that while Omega 3 had no discernible impact, atomoxetine considerably reduced the disorder's primary symptoms of hyperactivity and inattention.

Keywords: ADHD, inattention, hyperactivity, atomoxetine, Omega-3.

1. INTRODUCTION

At the moment, child psychiatry is recognized as a distinct medical specialty. It is a subspecialty of general psychiatry dedicated to treating young patients. In the assessment and care of the child, the entire family and its entourage are involved. This specialty now includes newborns, young children, and adolescents instead of just those with mental disabilities. The area of child psychiatry encompasses a wide range of conditions, from disorders in adolescents to challenging early mother-child relationships. Mental illness, autism, depression, attention deficit disorder with or without hyperactivity, and other conditions are included in this group. Children with attention deficit disorder, whether or not they are hyperactive, struggle with social skills, which is a major issue for their ability to operate adaptively (Massé, Verreault, Verret, 2019). ADHD affects Algerian children in the same way as 5 to 8% of the world's child population.

Psychologists, child psychiatrists, and school doctors are alarmed since this illness invariably results in failure in the classroom, and later in life, in the family and workplace. Health facilities offer a variety of medical treatments for the management of the illness, which fall into two categories: drugs that stimulate the brain and those that do not.

As a matter of fact, atomoxetine is the first medication available on the market for the treatment of attention deficit disorder in children and adolescents aged 6 and older, with or without hyperactivity. This represents a novel and intriguing medical therapeutic strategy. Aside from the drug itself, parents who use food supplements—especially Omega 3—as a mild and natural therapy for their kids are making a wise decision.

Thus, the following is problematic: Is atomoxetine a more effective dietary supplement than Omega 3 based supplements? Can atomoxetine effectively alleviate the primary symptoms associated with ADHD?

Is Omega 3 a good enough substitute for medication in the treatment of hyperactive kids? In response, a prospective observational and comparative study was conducted at the UHC Tlemcen psychiatric service over a 12-month period, using *the Scale of Conners for parents*. The study involved a sample of sixty children with an ADHD diagnosis, divided into two groups based on the parents' preference: one group was treated with atomoxetine before and after, while the other group received Omega 3 before and after.

2. attention deficit disorder with or without hyperactivity

ADHD is internationally described as a neurodevelopmental disorder, which affects the development of certain regions of the child's brain due to a dysfunction of certain neuromediators, including dopamine. It is characterized by a deficiency in the self-control processes, which are responsible for the optimal adaptation of the individual's behavior to his environment. ADHD is a complex, debilitating and chronic disorder. In 60% of cases, this disorder persists until adulthood, hence its chronic nature. ADHD is said to become complex because it includes a set of disruptive behaviors leading to symptoms of inattention, impulsivity and hyperactivity. In addition, its disabling nature is due to its harmful effects that affect the psychological, social, academic and educational levels. Therefore, attention deficit disorder with or without hyperactivity must be considered as a heterogeneous clinical entity.

The term hyperactivity may seem complex and relates to two concepts. On the one hand, hyperactivity itself is the only symptom of intense activity. On the other hand, and in its global sense, hyperactivity presents itself as a syndrome and brings together the triad of symptoms. Constitutionally, hyperactivity either reflects an excess need for motor skills or corresponds to an inability to inhibit it (Becker Ed, 2019).

It mainly affects boys. For example, children with ADHD spend 66% less time being still, move their heads 3 to 4 times more, and cover a play area 3 to 8 times larger than children without the disorder (Teicher MH, Ito Y, 1996).

Attention deficit:

Attention is the concentration of mental activity on an object or a practice of an action. The American philosopher and psychologist William James described inattention as "the mind's taking possession, in a clear and vivid form, of one of several objects or sequences of thoughts that seem possible" (James W, 1985). This therefore involves a choice and selection of relevant information by the mind. We can typically distinguish 3 forms of attention. First, selective attention which allows us to focus on something while ignoring disturbing elements, for example the noise around us. The second form is sustained attention to maintain effective vigilance over time. Finally, there is divided attention, which corresponds to the ability to distribute attentional resources over several simultaneous tasks (Purper-Ouakil, D, 2011).

Impulsivity:

Impulsivity manifests itself as a loss of self-control and intolerance to waiting. It can be motor or cognitive. The child can not finish his words; he finds it difficult to wait his turn in situations where it is required to wait, it is difficult to play calmly; interrupts others or imposes his presence. It rushes to answer questions before they are finished being asked (Petot D, 1999) ... etc. These impulsive reactions can be a source of accidents and perceived as aggressiveness or insolence by those around them, which can lead to the child's rejection.

3. The diagnostic process:

Because of the complexity of this disorder and its multiple disturbances, the diagnostic process is quite long. Generally, the first signs of ADHD appear around the age of 4 1/2. The absence of specific biological tests gives a purely clinical and observational aspect to the diagnosis. It will be asked after several interviews with the child and the parents (observation of the child's behaviour, assessment of the family environment, clinical and psychiatric examinations, assessment of the impact of the disorder). During consultations, the child psychiatrist notes motor agitation that has been present since kindergarten and/or academic difficulties from CP, with a social impact. When ADHD symptoms persist despite the installation of psychoeducational care, pharmacological treatment is then remedied.

4. Presentation and mechanism of action:

The first non-stimulant medication to be licensed for the treatment of attention deficit hyperactivity disorder (ADHD) in children and adolescents younger than six years old is atomoxetine (Strattera®). Atomoxetine has no affinity for other transporters or neurotransmitter receptors and is a highly selective inhibitor of the presynaptic norepinephrine transporter. The recommended oral dosage is 1.2 mg/kg, given once or twice a day (C Gaillez FS, E Perrin, 2007). In the United States, it is the first non-psychostimulant medication to be approved by the Food and Drug Administration (FDA). It has been sold for ADHD since 2002 (Wahl G, 2012). Following oral administration, atomoxetine is rapidly and nearly entirely absorbed, with a mean maximum plasma concentration (C_{max}) reported between one and two hours after delivery. After oral administration, the absolute bioavailability of atomoxetine varied between 63% and 94% based on interindividual differences in low first-pass metabolism. You can take atomoxetine with or without food. The drug atomoxetine is extensively (98%) attached to plasma proteins, mainly albumin. The primary enzymatic mechanism via which atomoxetine is biotransformed is cytochrome P450 2D6 (CYP2D6). Poor metabolizers, or those with decreased activity of this metabolic route, make up around 7% of the Caucasian population and have higher plasma concentrations of atomoxetine than do people with normal enzyme activity, or extensive metabolizers. The maximal steady-state concentration (C_{ss max}) and area under the curve (AUC) of atomoxetine are roughly five times and ten times higher, respectively, for poor metabolizers than for extensive metabolizers. 4-hydroxyatomoxetine is the main oxidative metabolite that is produced and it quickly glucuronidates. Hydroxyatomoxetine circulates in plasma at substantially lower amounts than atomoxetine, although being equally active. While the CYP2D6 pathway is the main mechanism for the metabolism of 4-hydroxyatomoxetine, numerous additional cytochrome P450 enzymes may also play a role in the production of 4-hydroxyatomoxetine, albeit at a slower pace, in patients with CYP2D6 activity deficiencies. At therapeutic levels, atomoxetine has no effect on CYP2D6 induction or inhibition.

After oral administration, the mean elimination half-life of atomoxetine is 3.6 hours for people with extensive metabolisms and 21 hours for people with inferior metabolisms. The primary excretion of atomoxetine is as 4-hydroxyatomoxetine-O-glucuronide, primarily in urine. Atomoxetine's pharmacokinetics are linear in both weak and extensive metabolizers across the dose range examined. Because of the high risk of mydriasis, atomoxetine treatment is not recommended for patients with angle-closure glaucoma or children younger than six years old. Furthermore, it is not recommended to take atomoxetine within 15 days after non-selective MAOI-type antidepressants such as iproniazid. The combination of this medication with substances that have noradrenergic or vasopressor qualities, like venlafaxine or pseudoephedrine, should be avoided because of their synergistic effects. Additionally, atomoxetine might intensify the cardiovascular system's response to β -2 agonists. It is necessary to properly monitor its co-administration at high doses with substances like terbutaline (Bricanyl®) or salbutamol (Ventoline®) in the treatment of asthma. It is important to remember that CYP 2D6 metabolizes atomoxetine. Because of this, we need to exercise caution when it comes to its interactions with cytochrome inducers (like carbamazepine, phenobarbital, rifampicin, etc.) or inhibitors (like fluoxetine or paroxetine), as they may alter the plasma concentrations of atomoxetine and, consequently, its therapeutic efficacy (de Lara AC, Guinard M, 2006).

Atomoxetine adverse effects include gastrointestinal issues, anxiety, tachycardia, elevated blood pressure, sinusitis or flu infections, weight loss, and urogenital issues. There have also been reports of more severe side effects, like as increased risk of suicide, liver damage, Raynaud's syndrome, or stroke. Throughout treatment, it is important to periodically check blood pressure, heart rate, and growth curve (HAS, 2011). Overdosing might cause sleepiness, restlessness, strange behavior, and stomach problems. Research has indicated that there were no negative effects or rebound occurrences when atomoxetine therapy was stopped.

5. Polyunsaturated fatty acids:

Research has demonstrated that, in comparison to controls, those with attention deficit hyperactivity disorder had lower levels of omega-3 and omega-6 fatty acids. Effectiveness of omega-3 and omega-6 product supplementation in ADHD patients has been shown in clinical trials (La Chance L, McKenzie K, Taylor VH, Vigod SN, 2016). The term "essential fatty acids" refers to long-chain polyunsaturated fatty acids (PLCFA), such as omega 3 and omega 6, which the body cannot produce on its own and must get from diet. Due to their role in maintaining the fluidity of cell membranes and, consequently, the appropriate transmission of information, these AGs are crucial for the brain's normal operation. AGPLC supplementations significantly reduced ADHD symptoms, according to an English study (Puri A ReB, 2002). As zinc is a coenzyme involved in AGPLC anabolism, a zinc shortage may potentially be linked to AGPLC deficiency. As a result, and as we've already mentioned, kids with ADHD are zinc deficient.

6. Method:

The objective of the study is to compare the effectiveness of the drug atomoxetine versus the Omega 3 food supplement during the therapeutic management of children with ADHD at the level of the Tlemcen University Hospital psychiatry department during the year 2020-2021, and to evaluate the level of efficacy of the drug Atomoxetine (Strattera) during the therapeutic management of children diagnosed with ADHD in the psychiatry department of the Tlemcen University Hospital. We used The Conners Scale for Parents (abbreviated form) before and after three months of atomoxetine intake and Conners Scale for Parents (abbreviated form) before and after three months of taking Omega 3. This is a prospective observational study with comparative aims, evaluating the efficacy of the drug atomoxetine (Strattera) versus Omega 3 by the Conners Scale for Parents (abbreviated form) before and after three months of taking Omega 3. The study was carried out at the psychiatry department of Tlemcen University Hospital, over a period spanning from January 2020 to December 2020. The recruitment of children took place over a period of 12 months. We included children aged > 6 years and < 14 years, informed and willing parents of children, child diagnosed with ADHD according to DSM 5 criteria, all clinical forms included, and patient without a contraindication to atomoxetine and residents in the wilaya of Tlemcen.

The data were collected in two stages: The first stage: - For each parent, a form was drawn up containing the following data: Sociodemographic data of the child, the child's personal and family history, the socio-economic level of the child. Clinical evaluation and management used to evaluate the effectiveness of the treatment envisaged, another sheet has been distributed (the Conners scale for parents abbreviated form), this is a questionnaire that includes 10 items to which parents respond with (not at all, a little, a lot or a lot), a score greater than 15 can be considered pathological. The children were divided into two groups according to the choice of treatment approved by their parents: atomoxetine or Omega 3. The second step: after 03 months. A second copy of the Conners questionnaire (short form) is issued to the parents after 3 months of treatment follow-up to assess the improvement in the child's symptoms and thus estimate the degree of effectiveness of atomoxetine versus omega 3. Each "not at all" response is counted as "0", each "a little bit" is classified as "1", each "a lot" is counted as "2" and each "hugely" is taken as "3".

Statistical analysis is carried out using:

- SPSS v20 software for data entry and analysis.

Data processing was based on the following method:

a- A descriptive analysis with two variables: qualitative and quantitative.

- For qualitative variables, we used numbers and percentages.
- For quantitative variables, we measured the means.

b- A comparative analysis between the results obtained in the first group having taken atomoxetine and those of the second group using Omega 3 was carried out using the chi-square test. A statistically significant difference was considered when the degree of significance $p < 0.05\%$.

7. Results:

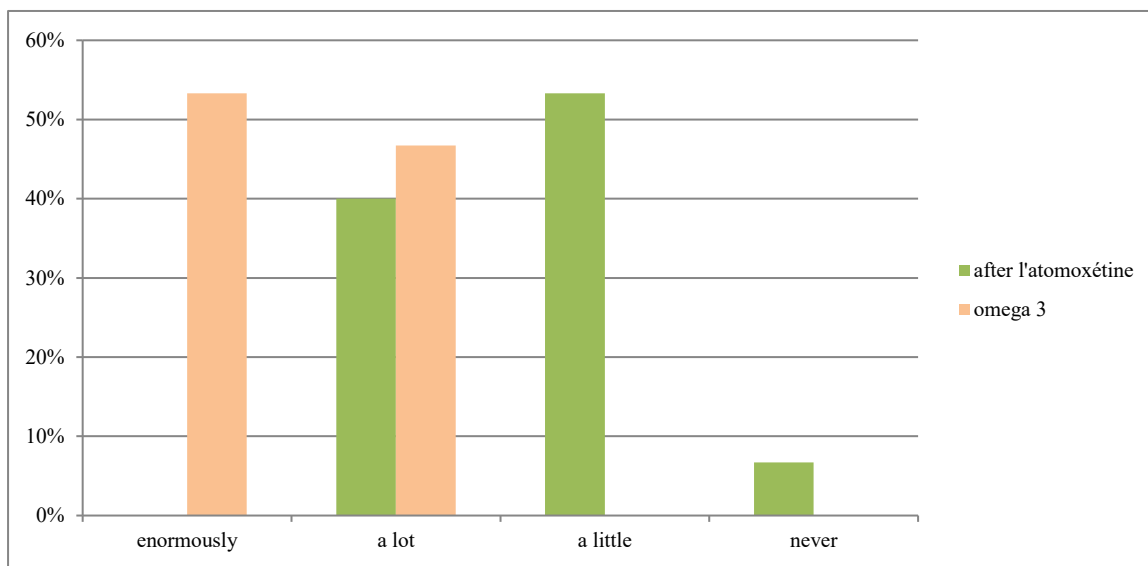
Comparison of ADHD symptom assessment between the use of atomoxetine and Omega 3

Hyperactivity:

Table 1: The hyperactivity assessment comparison between the use of atomoxetine and Omega 3.

| The symptom | intensity | After atomoxétine | | After Oméga 3 | | P |
|-------------------------|-----------|-------------------|-------------|---------------|-------------|-------|
| | | effective | Perrcentage | effectif | Pourcentage | |
| Agitated or very active | Extremely | 00 | 00% | 16 | 53.3% | 0.001 |
| | A lot | 12 | 40% | 14 | 46.7% | |
| | A little | 16 | 53.3% | 00 | 00% | |
| | Never | 02 | 6.7% | 00 | 00% | |
| | Total | 30 | 100% | 30 | 100% | |

Figure 1: Comparison of the evolution of hyperactivity between the use of atomoxetine and Omega 3



In our sample, we found that the use of atomoxetine improved hyperactivity by decreasing the frequency "enormously" by 100%, compared to the results obtained after taking Omega 3 where we noted a percentage of 53.3% for the intensity "enormously". Comparison of the assessment of hyperactivity between the use of atomoxetine and Omega 3 shows a statistically significant difference, $p=0.001$.

Inattention:

Table 2: The comparison of inattention evaluation between the use of atomoxetine and Omega 3.

| Symptom | Intensity | After atomoxétine | | After Oméga 3 | | P |
|-------------------|-----------|-------------------|------------|---------------|-------------|-------|
| | | effective | percentage | effectif | Pourcentage | |
| easily distracted | Greatly | 00 | 00% | 20 | 66.6% | 0.001 |
| | A lot | 14 | 46.7% | 08 | 26.7% | |
| | A little | 14 | 46.7% | 02 | 6.7% | |
| | Never | 02 | 6.7% | 00 | 00% | |
| | Total | 30 | 100% | 30 | 100% | |

P: Threshold of significance

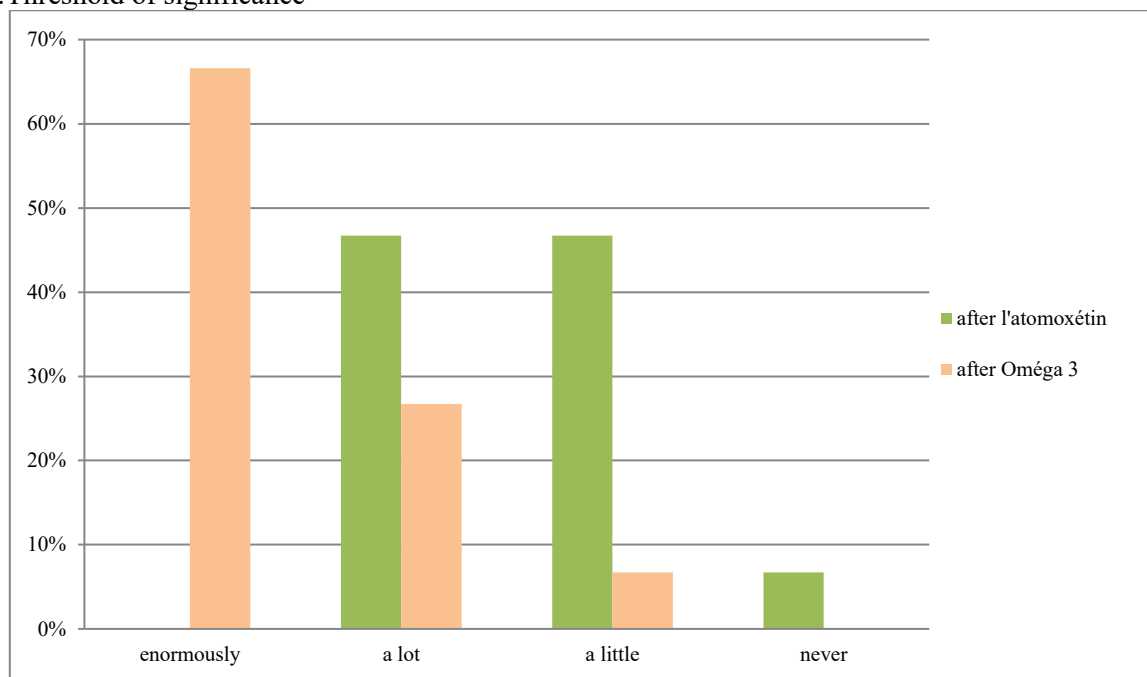


Figure 2: Comparison of the assessment of inattention between the use of atomoxetine and Omega 3.

In our population, we found that the use of atomoxetine improved inattention by decreasing the frequency 'enormously' towards 00%, compared to the results obtained after taking Omega 3 where we noted a percentage of 66.6% for the intensity "enormously". The comparison of the assessment of inattention between the use of atomoxetine and Omega 3 shows a statistically significant difference, $p=0.001$.

Impulsivity:

Table 3: Comparison of the assessment of impulsivity between atomoxetine and Omega 3.

| The symptom | Intensity | After atomoxétine | | After Oméga 3 | | P |
|---------------------------|------------|-------------------|-------------|---------------|-------------|-------|
| | | effectif | pourcentage | Effectif | Pourcentage | |
| Outbursts of anger | Enormously | 00 | 00% | 00 | 00% | 0.311 |
| | A lot | 08 | 26.7% | 04 | 13.3% | |
| | A little | 14 | 46.7% | 10 | 33.3% | |
| | Never | 08 | 26.7% | 16 | 53.3% | |
| | Total | 30 | 100% | 30 | 100% | |

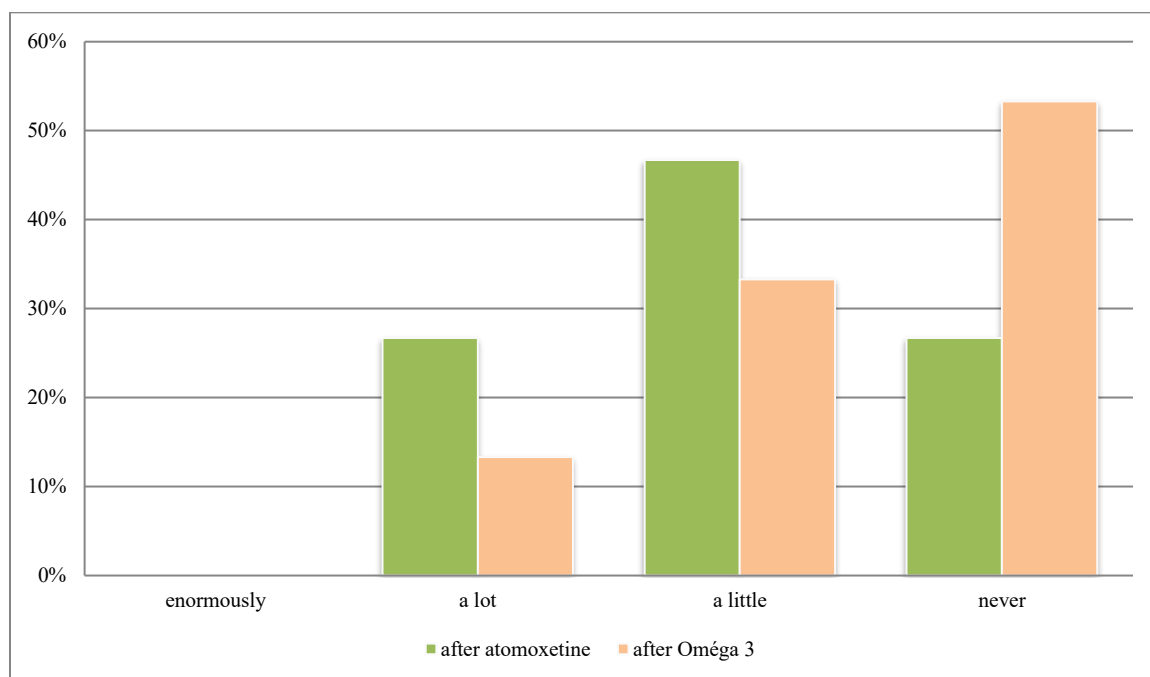


Figure 3: Comparison of the assessment of impulsivity between the use of atomoxetine and Omega 3.

According to the results of our study, there was no significant improvement in impulsivity, either after the use of atomoxetine or after taking the Omega 3 dietary supplement. Comparison of impulsivity assessment between atomoxetine and Omega 3 did not show a statistically significant difference, $p = 0.311$.

The pathological score: According to the results of our study, we noted that the improvement in the symptoms of inattention deficit disorder with or without hyperactivity after taking atomoxetine (with an average of 6.26 points) is greater than that obtained by the use of the Omega 3 food supplement (with an average of 1 point).

7. Discussion:

- Study of the efficacy of the drug atomoxetine:

- According to our study, the use of atomoxetine significantly improves some symptoms of attention deficit hyperactivity disorder; the pathological score of the *Conners Parents scale* (abbreviated form) was significantly reduced.

- According to Gaillez, Sorbara and Perrin, who published a review of the literature, the effectiveness of atomoxetine on ADHD symptoms was demonstrated in six randomized, double-blind, placebo-controlled clinical trials, by improving the score of the ADHD-RS symptoms scale (ADHD rating scale) and by improving the scores of other rating scales (CGI, Conners parents / teacher) (Gaillez C, Sorbara F, Perrin E, 2007).

- The rate of improvement in *the Conners Parent Scale* score (short) in our study is close to the results of this review.

- A study done in Toronto, Ontario showed the effectiveness of atomoxetine in an extensive and rigorous clinical trial program in children and adolescents with ADHD. More than 6,000 children and adolescents, including more than 200 Canadians have taken atomoxetine (some for as long as three years) in completed and ongoing short- and long-term clinical trials. The primary efficacy of atomoxetine was established using six randomized, double-blind, placebo-controlled registration studies.

Recent research finds that atomoxetine is effective and well tolerated in children and adolescents (Spencer et al., 2002a, 2002b; Wernicke et al., 2002). They proved that the effectiveness of atomoxetine was superior to a placebo on the main symptoms and its effects (Bader M, 2004).

- Two open pilot trials initially demonstrated the effect of atomoxetine on ADHD symptoms. The superiority of atomoxetine versus placebo was then evaluated during 6 short-term double-blind randomized clinical trials including a total of more than 1,000 patients, children and adolescents (Galliez C, Sorbara F, Perrin E, 2007).

Assessment of hyperactivity after the use of atomoxetine:

- In our study, we noted a significant decrease in the intensity of the hyperactivity symptom ($p = 0.000$) after taking atomoxetine.

- In 2005, H.L. Starr and L. Ciccone found that the use of atomoxetine in children suffering from ADHD significantly reduced their hyperactivity ($p < 0.0001$) (Kemner JE, Starr HL, Ciccone PE, Hooper-Wood CG, Crockett RS, 2005).

- According to a French study, children who used atomoxetine became less hyperactive. According to the author, taking atomoxetine significantly reduced the intensity of hyperactivity in these children (Michelson D, Faries D, Wernicke J, Kelsey D, Kenrick K, Sallee FR, and all, 2001).

- Another American study proved the effectiveness of atomoxetine in improving hyperactivity in 16 children suffering from attention deficit hyperactivity disorder ($p = 0.043$) (Harfterkamp M, van de Loo-Neus G, Minderaa RB, Van der Gaag R-J, Escobar R, Schacht A, and all, 2012).

- The Journal of Clinical and Experimental Neuropsychiatry published a study on January 6, 2017, where it revealed that atomoxetine was significantly effective in reducing hyperactivity (Liu Q, Zhang H, Fang Q, Qin L, 2017).

The results of our study were perfectly consistent with the literature regarding the reduction of hyperactivity.

Assessment of inattention after using atomoxetine:

- In our study, we noted that taking atomoxetine significantly improved inattention in children suffering from attention deficit disorder with or without hyperactivity ($p = 0.0001$).

- Several studies have shown that atomoxetine is effective in reducing the symptom of inability to pay attention.

- According to a French study in 2005, researchers found that ATX proved its effectiveness in a school situation by improving the performance and output of patients who used it (Gaillez C, Sorbara F, Perrin E, 2007).

Assessment of impulsivity after atomoxetine use:

The results of our study show that TXA may reduce the intensity of impulsivity in children with ADHD, but the improvement was not statistically significant ($p = 0.171$).

The use of the norepinephrine reuptake inhibitor, atomoxetine, to treat ADHD, suggests that norepinephrine transporter (NET) activity may be important in regulating impulsive behavior (Sun H, Cocker PJ, Zeeb FD, Winstanly CA, 2012).

An American study found that atomoxetine, when used as a pharmaceutical treatment for ADHD in children, significantly decreased their level of impulsivity (De Bruyckere et al., 2016) ($p < 0.05$) (Coppola M, Mandola R, 2018). However, the following caution was added: "During clinical trials, children and adolescents treated with atomoxetine exhibited greater rates of hostility (primarily aggression, oppositional behavior, and anger) and emotional lability than those given with placebo. It is important to keep a close eye on kids in case they start acting more aggressively, get hostile, or

become emotionally unstable. An American study found that atomoxetine, when used as a pharmaceutical treatment for ADHD in children, significantly decreased their level of impulsivity (De Bruyckere et al., 2016) ($p < 0.05$ (Coppola M, Mandola R, 2018)). However, the following caution was added: "During clinical trials, children and adolescents treated with atomoxetine exhibited greater rates of hostility (primarily aggression, oppositional behavior, and anger) and emotional lability than those given with placebo. It is important to keep a close eye on kids in case they start acting more aggressively, get hostile, or become emotionally unstable."

Evaluation of the pathological score:

The decrease in the pathological score with atomoxetine was significantly significant (4 – 12 points) between baseline and the end of our study.

A study carried out by the Transparency Commission on 19 January 2011 proved that the decrease in the score on the ADHDRS scale was significantly greater with atomoxetine (-15.1 points) than with placebo (-4.2 points).

In the same study, the primary efficacy endpoint was the change in total score (ADHD RS-Parent) from baseline to end of the study. After 8 weeks of treatment, the decrease in total score was greater with atomoxetine once daily than with placebo (-16.75 vs. -7.03; $p < 0.001$). The transparency commission also presented an analysis in 148 children and adolescents, with an average age of 11.2 years, who were randomized into two groups: placebo ($n=72$) or atomoxetine ($n=76$). The total YGTSS score at baseline was 21.7 in atomoxetine group and 22.2 in the placebo group (low to moderate severity). The average change in YGTSS score was -5.5 in the atomoxetine group and -3 in the placebo group after 18 weeks of treatment.

The results obtained by our study also present a slight reduction in the intensity of the symptoms of the disorder and lead to the same outcome of these studies. The differences in the rate of improvement are justified by the size of the population studied and the form of the scale used.

Evaluation of the effect of Omega 3:

- According to the results of our study, we did not find a significant improvement in the pathological score of the *Conners Parent Scale* (abbreviated form) after the use of the Omega 3 dietary supplement. Based on a meta-analysis of the results of research on omega-3 fatty acids related to certain mental health disorders, (Freeman and al. 2006) concluded that the combination of omega-3 fatty acids EPA and DHA can decrease the severity of certain symptoms related to ADHD and mood disorders, with effective doses ranging from 1 to 9.6 g/day. According to studies (L Massé MV, C Verret, 2017). The literature did not report any significant data concerning the role of Omega-3 / Omega-6. Fatty acid supplements are not a dietary recommendation for children with ADHD. More recently, in a 2013 meta-analysis, Sonuga-Barke et al. reported a significant effect on ADHD symptoms, which was maintained when the analysis was restricted to the nine trials with absent or limited pharmacological treatment.

Evaluation of the efficacy of atomoxetine vs Omega 3 in improving ADHD symptoms:

Our study showed that Omega 3 can not be considered as a sufficient alternative in the management of hyperactive children. The results provided by the use of atomoxetine were superior and more satisfactory than those obtained by Omega 3 supplementation in reducing and improving the 3 essential symptoms of attention deficit hyperactivity disorder. We noted statistically significant differences for hyperactivity and inattention ($p = 0.001$).

- Annik Vincint and Michel Sirois stated that clinical research measuring the effects of this supplement is in its early stages. A few recent studies in children show a clinical effect superior to that of placebo. For the time being, supplements represent an option to be considered as an adjunct to ADHD treatments, and not an equivalent solution.

- The evaluation of the therapeutic efficacy of the drug atomoxetine by a questionnaire remains a subjective, declarative method, tending to overestimate or underestimate the intensity of the symptoms of the disorder.

- The limits of this work lie in the absence of additional radiological or biological examinations that can assess the child's condition.

8. CONCLUSION

The main objective of this study is to compare the efficacy of atomoxetine versus the effect obtained by the Omega 3 food supplement in the improvement of symptoms of attention deficit hyperactivity disorder in children followed at the CHU Tlemcen psychiatry department for twelve months. The children were divided into two groups according to the parents' choice of treatment, the first 30 children with subatomoxetine and the second 30 children with Omega3. The comparison was based on the assessment of symptoms of the disorder before and after the use of atomoxetine and Omega 3 for each group, by the Conners Parent Scale. Based on the results, atomoxetine was found not to show a significant difference in the total pathological score, but it significantly improved the main symptoms of the disorder, including inattention and hyperactivity, which proves the effectiveness of this drug, contrary to the results obtained by taking Omega 3 in which no significant improvement was noted either in the total pathological score or in the main symptoms of the disorder.

It therefore seems necessary to establish a pharmacological treatment based on atomoxetine for better management of attention deficit disorder with or without hyperactivity and to no longer be satisfied with simple Omega 3 supplementation which does not present a sufficient and satisfactory therapeutic alternative.

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