Neurological Research and Therapy

Open Access

Received: Jan 03, 2015
Accepted: Feb 10, 2015
Published: Feb 14, 2015

http://dx.doi.org/10.14437/NRTOA-2-109 Case Report Dixon Chibanda, Neurol Res Ther 2015, 2:1

Alleviating Symptoms of Attention Deficit Hyperactive Disorder Using Bal-A-Vis-X, a Non-Pharmacological Approach.

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Abstract

Approved pharmacological preparations for the treatment of Attention Deficit Hyperactive Disorder (ADHD) are not readily available in most low and middle-income countries. There is a growing body of alternative non-pharmacological interventions based on neuroplasticity that may address this treatment gap. Balance Auditory Vision Integration Exercises (Bal-A-Vis-X) are based on a series of gradually complex but modifiable rhythmic movements using sand bags and racquetballs. Sustained attention is demanded for the smooth execution of the exercises. The outcome of using Bal-A-Vis-X in children with a Diagnostic Statistical Manual (DSMV) diagnosis of ADHD is described.

Methods: Parents of 18 children with a clinical diagnosis of ADHD referred to a psychiatrist were offered Bal-A-Vis-X, methylphenidate or both, over a 6-week period. Eleven opted for Bal-A-Vis-X, 4 decided on oral methylphenidate, and 3 requested both methylphenidate and Bal-A-Vis-X.
Our primary outcome measure was duration of sustained attention after the 6-week period. Secondary outcome measures included a theta to beta ratio as measured by an Electroencephalogram (EEG).

Results: After 6 weeks of Bal-A-Vis-X, sustained attention increased by more than 15 minutes in 9 of 11 children who received the Bal-A-Vis-X. Duration of sustained rhythmic movements measured in minutes during Bal-A-Vis-X appeared to predict global improvement in schoolwork.

Conclusion: Bal-A-Vis-X has the potential of reaching out and making a difference to thousands of children in Africa who have no access to medication for ADHD.
There is need for adequately powered double-blinded randomized controlled trials aimed at establishing the efficacy and cost effectiveness of this promising technique.

Keywords: Attention Deficit Hyperactive Disorder (ADHD); Bal-A-Vis-X; Rhythm; Sustained Attention; Working Memory

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Introduction

Attention Deficit Hyperactive Disorder (ADHD) is the most common neurobehavioral disorder found in children [1] and is often associated with higher risk of reading, spelling, and math difficulties [2]. Little is known about ADHD in Sub-Saharan Africa [3], although data from South Africa suggests rates of over 17% with higher rates in children living with HIV [4].

Methylphenidate, a psycho-stimulant, is the most widely used pharmacological preparation for ADHD [5], however, it is not readily available in most Low and Middle Income Countries (LMIC) and side effects such as headache, insomnia, and dizziness may contribute to poor adherence [6, 7], while Atomoxetine, an alternative to methylphenidate, has been reported to increase suicidal behaviour [8] although this has recently been dispelled [9]. These factors including financial and cultural barriers contribute to the challenges of using medication for ADHD in our setting.

In recent years alternative non-pharmacological interventions aimed at addressing the core symptoms of ADHD, namely inattention, working memory, and hyperactivity [10] have been developed based largely on the growing body of knowledge on neuroplasticity [11-15].

One such intervention that has been in use for over 30 years is based on balance auditory vision integration exercises (Bal-A-Vis-X) developed by an American school teacher- Bill Hubert [16]. There is preliminary data supporting the efficacy of Bal-A-Vis-X [17] which consists of a series of over 300 exercises, most of which are done with sand-filled bags and /or racquetballs, often while standing on a balance board. Requiring multiple mid-line crossings in 3 dimensions, the exercises are steadily rhythmic with a pronounced auditory foundation, executed at a pace that naturally results from proper physical technique [18]. Individual exercises range from one hand tossing/ catching one sandbag to both hands bouncing/catching four racquetballs in a specified sequence. Partner exercises may call for six balls to be simultaneously in motion. Exercises address visual tracking deficiencies, auditory imprecision, impulsivity, balance and anxiety issues [18]. Some exercises combine bags or balls with feet patterns. In group settings the exercises demand cooperation, promote self-challenge, foster peer teaching while simultaneously alleviating a wide range of symptoms associated with a spectrum of Mental, Neurological and Substance use disorders (MNS).

Since 2011 Bal-A-Vis-X has been used in Zimbabwe as an alternative to medication for selected MNS disorders, particularly ADHD, when the option of medication has not been available. The following are a series of case reports based on children with a Diagnostic Statistical Manual (DSMV) [19, 20] diagnosis of ADHD who received Bal-A-Vis-X over a 6-8 week period. Multiple informants and evidence of impairment were used to obtain baseline data for these ADHD cases as recommended recently by Guler [21].

Methods

Parents/guardians of children between the ages of 9 and 16 referred to the psychiatrist for ADHD management were given the option of Bal-A-Vis-X or a prescription to import medication for ADHD. A total of 18(34%) children meting full criteria of ADHD based on the DSMV were described by their parents, teachers, school educational psychologist and a psychiatrist as being hyperactive, inattentive, unable to sustain focus when required to and struggling in basic mathematics. These children (n=18) had also been described as being clumsy, having poor coordination and generally struggling with hand eye coordination. All had a baseline Electroencephalogram (EEG) carried out by an independent EEG technician which showed a high theta to beta ratio of over 2.5:1 in the sensory motor cortex [22]. Parents were provided with information on both balavisx and pharmacotherapy options which included Ritalin, Concerta and Strattera which when not available in the country could be imported from South Africa if parents were able to pay out of pocket. Parents were informed that Bal-A-Vis-X was not standard treatment for ADHD in Zimbabwe but had been used elsewhere with promising results [17]. They were further requested to look up Bal-A-Vis-X on www.youtube. balavisx and on www.bal-a-vis-x.com before making a decision. All children in the Bal-A-Vis-X group received 6-8 one-on-one sessions of 30-40 minutes over a 6-8 week period under the instruction of the author, a psychiatrist, who had received over 80 hours of Bal-A-Vis-X training in England and Scotland over a 3 year period. The protocol for the ADHD treatment adapted from the Complete Bal-A-Vis-X training manual available on www.bal-a-vis-x.com is described in Table1.

Table 1: Components of the ADHD protocol for Zimbabwe adapted from the complete Bal-A-Vis-X training manual

Session	Session content (each session is 30-40minutes)	Homework
Session 1a	1 bag rectangle followed by 2-bag rectangle (15min) If managing go to 1b.	10min
Session 1b	Repeat above involving feet movements; ensure rhythm sustained for at least 4 min before proceeding to next exercise.	10min
Session 2*	2-bag rectangle with feet then introduce 2-bag oval focus on rhythm. If managing well go to 3.	10min
Session 3	Introduce 1 ball bounce, 1 ball "V" bounce. 2 ball bounce. Puppet arm bounce, focus on balance & rhythm. Repeat until rhythm becomes second nature.	15min
Session 4	Puppet ball bounce/ focus on rhythm /introduce verbal activity such as multiplication tables or Spelling while rhythm is sustained for at least 3min with short intervals.	15min
Session 5	Puppet arm bounce focusing on rhythm, verbal activity multiplication tables/spelling, sustained for 10minutes at a time while bouncing in a restricted area of no more than 40cmx30cm.	15min
Session 6	Puppet arm bounce/ rhythm/ alternate coloured balls sustain for 15 min maintaining rhythm while carrying out a verbal task such as multiplication tables. Further reduce restricted area.	15min
Sessions 7-8	Repeat any of the above as needed or move to 2 ball alternating bounce, or introduce a third ball depending on the child's progress or further reduce restricted area.	30min

The primary outcome measure was sustained attention, defined as being able to engage in homework/classroom related activity for a minimum of 15 minutes without distraction. Secondary outcome measures included changes in school reports, EEG and the theta to beta ratio. We used duration of sustained rhythm during Bal-A-Vis-X as a proxy measure for global improvement

Results

A total of 11 parents opted for Bal-A-Vis-X against 4 who opted to have medication (Methylphenidate) imported. Three (3) parents requested to have both methylphenidate and Bal-A-Vis-X. Table 2 shows the characteristics of the participants.

Table 2: Characteristics of participants by preferred treatment

	Bal-A-Vis-X n=11	Methylphenidate n=4	Combined n=3
Median age	11	10	10
Gender male (%)	7 (63%)	3(75%)	3(100%)
Socio-economic status of parents	Middle-High	Middle –high	Middle high
Mean number of sessions	7.4	N/A	6.4

Bal-A-Vis-X Group

It took an average of 4 sessions before rhythm was acquired with the 2-ball bounce (puppet arm bounce) in the Bal-A-Vis-X and combined groups. Eight out of the 11 participants in the Bal-A-Vis-X group became proficient in the puppet arm bounce after 5 sessions and were able to incorporate a verbal activity such as multiplying a series of numbers while maintaining rhythm with the balls. Seven out of the 11 were able to alternate ball colours while carrying out a verbal activity such as multiplication or spelling after the 6th session. After 6 sessions, 9 out of the 11 participants were able to sustain the puppet arm

bounce while simultaneously engaging in an additional verbal activity for over 10minutes with the balls bouncing in an area of 30cmx20cm as described (Table 3). The 9 that were able to sustain rhythm with the puppet arm bounce for more than 10 minutes showed the most marked improvement in the primary outcome measure of sustained attention of between 15min-20min while carrying out a school related activity.

Table 3: Changes in baseline variables after 6 weeks of Bal-A-Vis-X based on teacher/parent feedback

	Baseline (n=11)	At 6 weeks (n=11)
Sustained attention	Less than 5minutes	15-20 minutes in 9/11
School report	Disruptive/inattentive/poor in all subjects particularly maths	Calmer, contributes positively, math grades better in 8/11
Multiplication tables	Poor	Good in 9/11
EEG	Theta beta ratio (high)	Theta beta ratio (low)

Methylphenidate Group

Medication was prematurely stopped in one child after parents reported that the tablets had made their 10-year-old daughter dizzy and unable to eat properly after 8 days. The other 3 completed the course and showed marked improvement in all areas after 6 weeks.

Combination Group

The 3 children who received both Bal-A-Vis-X and medication showed the fastest and most significant improvement in all domains of the outcome measures at six weeks.

Of note was the association between duration of sustained, precise and rhythmic execution of Bal-A-Vis-X with global improvement in functioning as described by parents, teachers, and the EEG theta to beta ratios.

Discussion

The case series described above suggest that an intensive 6-8 week programme of Bal-A-Vis-X can alleviate symptoms of ADHD, leading to an improvement in attention and working memory. Bal-A-Vis-X engages both practitioner and client resulting in attention that is sustained particularly when rhythm is maintained and synchronised between client and practitioner. The neuropsychiatric benefits of Bal-A-Vis-X are not clear, however, it is reasonable to hypothesize that maintaining rhythm requires focus and sustained attention, which leads to the cumulative qualitative and quantitative changes observed in the EEG and the theta to beta ratio after the 6-week period. This hypothesis further supports the observed improvement in working memory.

In recent years several non-pharmacological approaches for treating ADHD and other MNS conditions have been developed and proved to be efficacious [11, 23, 24] thus supporting the theory of brain neuroplasticity. Indeed, some researchers have argued that psychological interventions can alleviate some of the ADHD symptoms [12]. Computer based interventions such as Cogmed [23] and nurofeedback [11] are readily available in high income countries, however, these approaches are generally costly and are beyond the reach of the greater population in Africa.

There are limitations to these case findings, which include absence of validated tools to measure outcomes, absence of information on the presence or absence of co-morbid conditions and blinding of the researcher, however, as an approach used within a clinic setting Bal-A-Vis-X appears to be well accepted

and has shown positive results in children with ADHD described here.

There is need to carry out adequately powered double blinded randomized controlled trials of this intervention in order to establish efficacy, cost effectiveness and to determine the long term sustained effect after the 6-8 week intervention.

Bal-A-Vis-X could be a cost-effective way of reaching out to thousands of children and adolescents in rural Africa where medication for ADHD and other MNS conditions are not available.

Acknowledgement

The author is supported by a Fogarty international research fellowship

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