

## Case report

# Use of dronabinol (delta-9-THC) in autism: A prospective single-case-study with an early infantile autistic child

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## Abstract

**Objective:** To evaluate the effectiveness of dronabinol (delta-9-THC) as supplementary therapy in a child with autistic disorder.

**Methods:** A child who met the DSM-IV (Diagnostic and Statistical Manual of Mental Disorders) criteria for a diagnosis of autistic disorder and who took no other medication during the observation time was included in an open and uncontrolled study. Symptom assessment was performed using the Aberrant Behavior Checklist (ABC) before and after six months of medical treatment.

**Result:** Compared to baseline, significant improvements were observed for hyperactivity, lethargy, irritability, stereotypy and inappropriate speech at follow-up ( $p=0.043$ ).

**Conclusion:** This study showed that the use of dronabinol may be able to reduce the symptoms of autism.

**Keywords:** early infantile autism, autistic disorder, dronabinol, cannabinoid

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## Introduction

Autistic Disorder (also referred to as early infantile autism, childhood autism, Kanner-Syndrome) is a pervasive developmental disorder characterized by marked impairment in social interaction, delayed language, and restricted repertoire of activity and interests (DSM-IV criteria for diagnosis of autistic disorder, 2007) [8][14]. Beside these core symptoms autistic children often show aggression against others and self-injurious behaviour, also have sleep problems and eating disorders. Early infantile autism affects 1 of 2000 children, with boys affected three times more often than girls. Autism does not equate with mental retardation, but intelligence is frequently limited (intelligence quotient (IQ) below 70). One quarter of autistic children achieve good results on IQ tests, termed 'high functional autism'. The cause of autism is still not fully explored, but seems to be multifactorial (including genetic, environmental and neurobiochemical disorders) [19]. Cog-

nitive Behavioural Therapy is the gold standard in treating children with early infantile autism and is supported by occupational therapy, physical therapy and pharmacological intervention (e.g. antipsychotic drugs) [4][9][12][13][17][18].

Dronabinol, or tetrahydrocannabinol /  $\Delta$ -9-THC, is a purified cannabinoid. The main accepted field of use is in oncology to reduce nausea and in AIDS to increase appetite, but has also been used in chronic pain patients, inflammatory bowel diseases (Crohn's disease, ulcerative colitis) and multiple sclerosis for muscle relaxation and neuropathic pain [9]. It may also be used for major depression and Tourette's syndrome [1][6][11].

To date there have been no reports of the use of cannabinoids in autism. However, in internet blogs and discussion forums there are many reports of parents who have tried THC for their autistic children, but without medical monitoring and inappropriate administration.

**Table 1.** Wilcoxon Rank Sum Test for samples / pre- & post-values

Subscales	Before (May 2009)	After (November 2009)
Irritability	38	13
Lethargy	23	11
Stereotype	16	9
Hyperactivity	47	20
Inappropriate speech	6	0
P-value for Wilcoxon rank sum test	0.04311	

There are well known alterations of neurotransmitters in autistic people especially in the cerebral cannabinoid receptor system [5]. We therefore asked whether dronabinol could safely be used in autism and what outcomes can be achieved within an observation period of six months.

## Methods

This study involved a six year old boy with early infant autism (F84.0), who was diagnosed in the Pediatric Clinic Graz at the age of three. The diagnosis had been made using DSM-IV criteria (American Psychiatric Association, Diagnostic Manual of Mental Disorders,

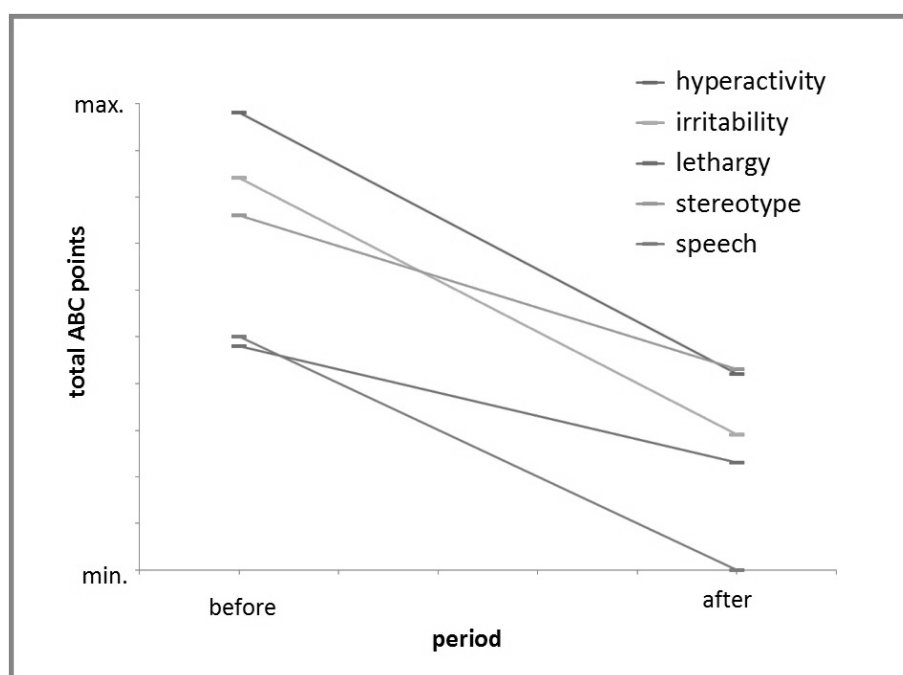
4th Edition) and confirmed by ADOS (Autism Diagnostic Observation Schedule) and ADI (Autism Diagnostic Interview) [2][3]. During the six months of follow-up the child did not start any new therapies or change existing assistance measures.

At beginning and end of this study symptom severity was determined by using the ABC (Aberrant Behavior Checklist) [7]. This is a questionnaire consisting of 52 questions with a rating scale from zero to three (0 ... no problem, 3 ... severe problem) filled out by an examiner together with the parents. Results are stratified in five subscales "hyperactivity" (min.0/max.48), "lethargy"(min.0/max.48), "stereotype"(min.0/max.21), "irritability"(min.0/max.45) and "inappropriate speech"(min.0/max.12). Analysis was done with SPSS (SPSS 2002-10) by using the Wilcoxon Rank Sum Test. Statistical significance was set with  $p \leq 0.05$ .

The therapy used was dronabinol drops (dronabinol solved in sesame oil). Initial dosage was one drop (0.62mg) in the morning which was gradually increased from day to day.

## Results

During the six months follow-up the subject received only dronabinol therapy. The maximum tolerated dose effect was reached at 2-1-3 (two drops in the morning,

**Figure 1.** Change of ABC subscales within six months.

one drop midday, three drops in the evening), total daily dose of 3,62 mg dronabinol. No adverse effects were reported during treatment.

The ABC subscales significantly changed over six month ( $p = 0.04$ ) (see Table 1). Hyperactivity decreased by 27 points, lethargy was reduced by 25 points and irritability by 12 points. Stereotypic behaviour de-

creased by 7 points and inappropriate speech improved by 6 points (see Figure 1).

## Discussion

This uncontrolled single case study suggests that dronabinol may reduce symptoms in early infant autism.

This may have been achieved by modifying cannabinoid levels in the central nervous system. Larger controlled studies are needed to explore this effect. Dronabinol will likely not replace cognitive behavioural therapy with early intervention, but we believe that as an additional support it may be effective and better tolerated than many existing antipsychotic drugs.

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