

# Low Carbohydrate Diet (SCD/GAPS) for Children with Autistic Spectrum Disorder

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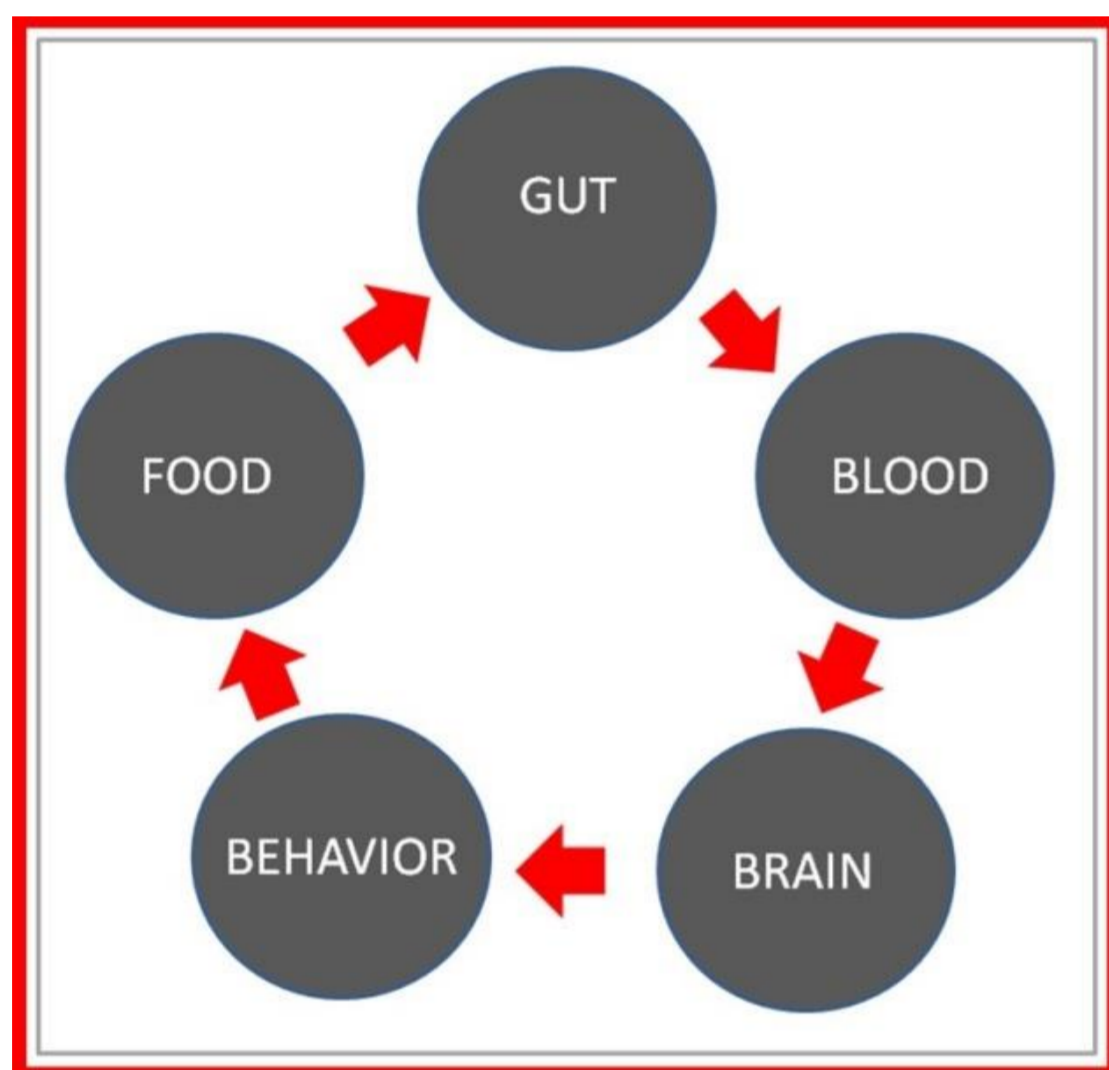
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## Introduction

- According to the American Psychiatric Association, autism spectrum disorder (ASD) is a complex developmental condition that involves persistent challenges in social interaction, speech and nonverbal communication, and restricted/repetitive behaviors. The expression of ASD and the severity of symptoms are different in each person [1, 2].
- According to Centers for Disease Control and Prevention (CDC, 2014), about 1 in 59 children in USA have been identified with ASD [3].
- Children with ASD often have digestive problems and significant nutritional deficiencies [4]. In several nutritional and dietary intervention studies, it has been demonstrated that, by addressing underlying digestive conditions, one can alleviate expression of some autistic symptoms [5].



Gut to behaviour cycle [4]

- The Gluten-Free / Casein-Free diet (GF/CF) is the most frequently used dietary intervention for ASD [5].
- Low carbohydrate diet** has not been extensively studied in regard to ASD, and its potential in reducing ASD symptoms in children is explored in this study.

## Aim

Objective of the study was to investigate the potential of low carbohydrate diet (SCD/GAPS) and supplements in reducing some autistic spectrum disorder (ASD) symptoms in children.

## Methods

- A prospective quantitative case-control 3-month interventional study of nutritional and dietary treatment
- 17 children from Latvia and UK with ASD (diagnosed or not)
- The intervention - a **low carbohydrate dietary plan** - Specific Carbohydrate Diet / Gut and Psychology Syndrome diet (SCD/GAPS) - and a few **nutritional supplements** (ω-3 fatty acids, ascorbyl palmitate, probiotics, vitamin D, vitamin C)

January - March 2019

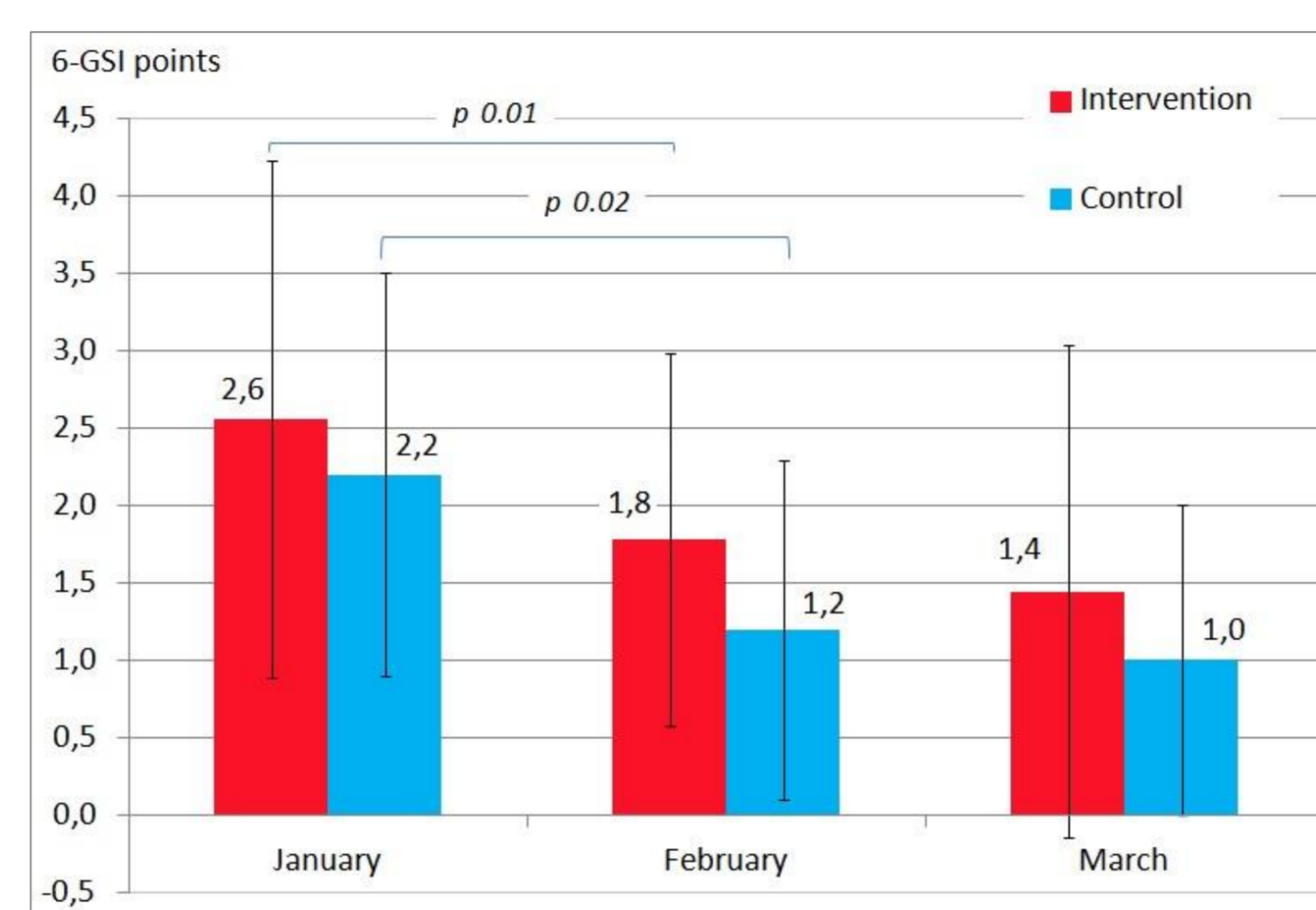
INTERVENTION group 10 children with ASD	Questionnaires	CONTROL group 7 children with ASD
• SCD / GAPS diet	January 2019 6 Questionnaires	
• ω-3 fatty acids		
• Vitamin D	February 2019 2 Questionnaires	
• Vitamin C		
• Ascorbyl-palmitate	March 2019 7 Questionnaires	
• Probiotics		

- Autistic and digestive symptoms of children were evaluated by parents using 7 validated questionnaires (ATEC, MSEC, 6-GSI, ABC, SSP, ASD, PGI) at the beginning of the study, middle and end of study:
  - 6-GSI - 6-Gastrointestinal Severity Index
  - ATEC - Autism Treatment Evaluation Checklist
  - MSEC - Mental Synthesis Evaluation Checklist
  - ABC - Aberrant Behaviour Checklist
  - SSP - Short Sensory Profile
  - ASD - Autistic Spectrum Disorder Assessment Scale
  - PGI-2 - Parent Global Impression – Revised-2
- Parental global impression (PGI) assessed change in 17 symptoms using a 7-point scale ranging from -3 (much worse) to 3 (much better). Average PGI score in each group was calculated

## Results

### Gastrointestinal symptoms (6-GSI)

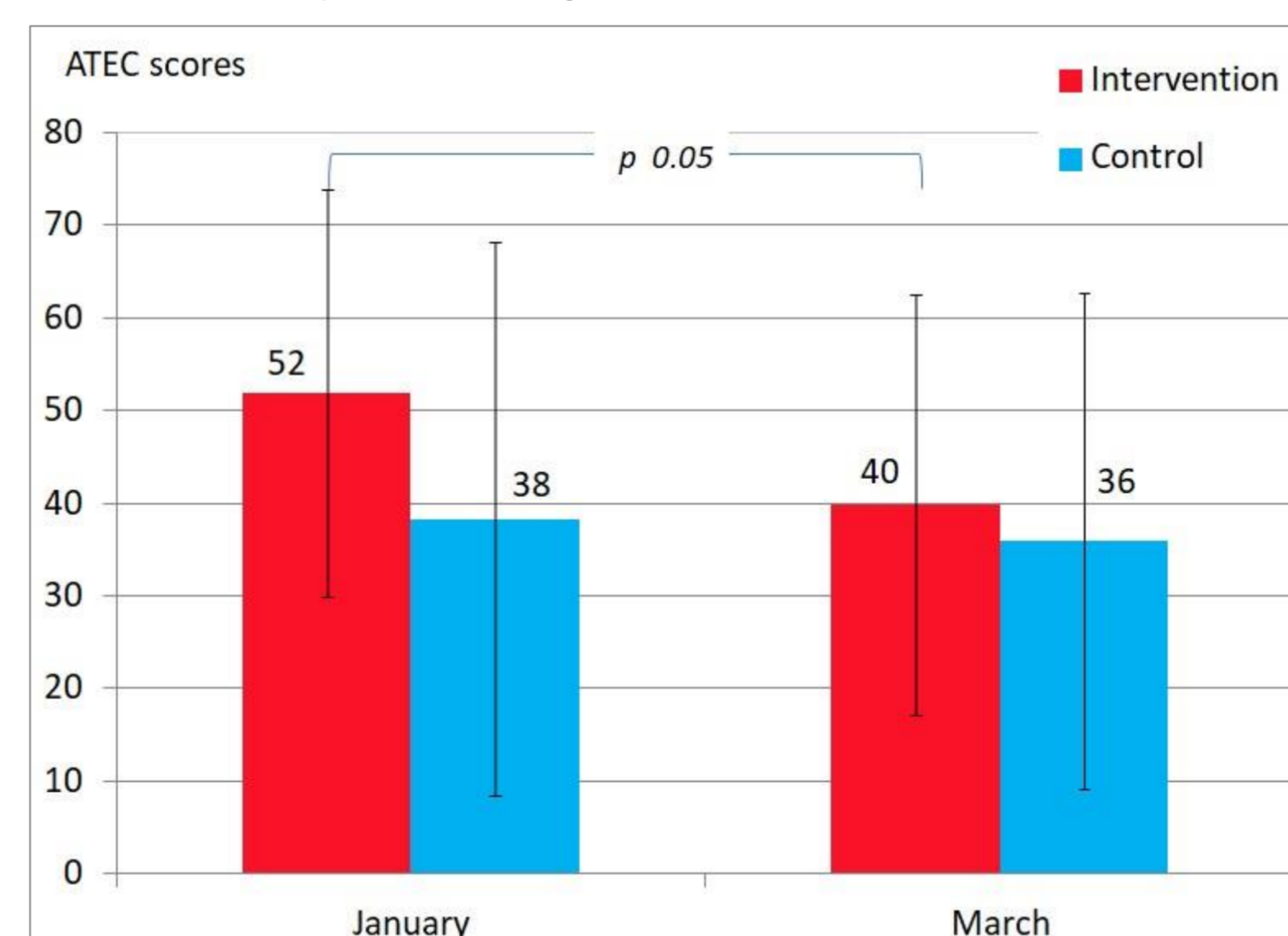
- Constipation, diarrhea, bloating, abdominal pain, consistency and smell of feces were evaluated by parents three times during the study
- Almost all children (15 out of 17) had gastrointestinal symptoms – flatulence, constipation, unformed stool, abdominal pain
- Gastrointestinal symptoms improved in both groups, especially, abdominal pain and bloating



Total 6-GSI scores during the study. Data from the questionnaire 6-Gastrointestinal Severity Index. Higher scores indicate greater severity. Only children with symptoms present are included here (Intervention group n=9, Control group n=5). Error bars represent standard deviations

### Autism Treatment Evaluation Checklist (ATEC)

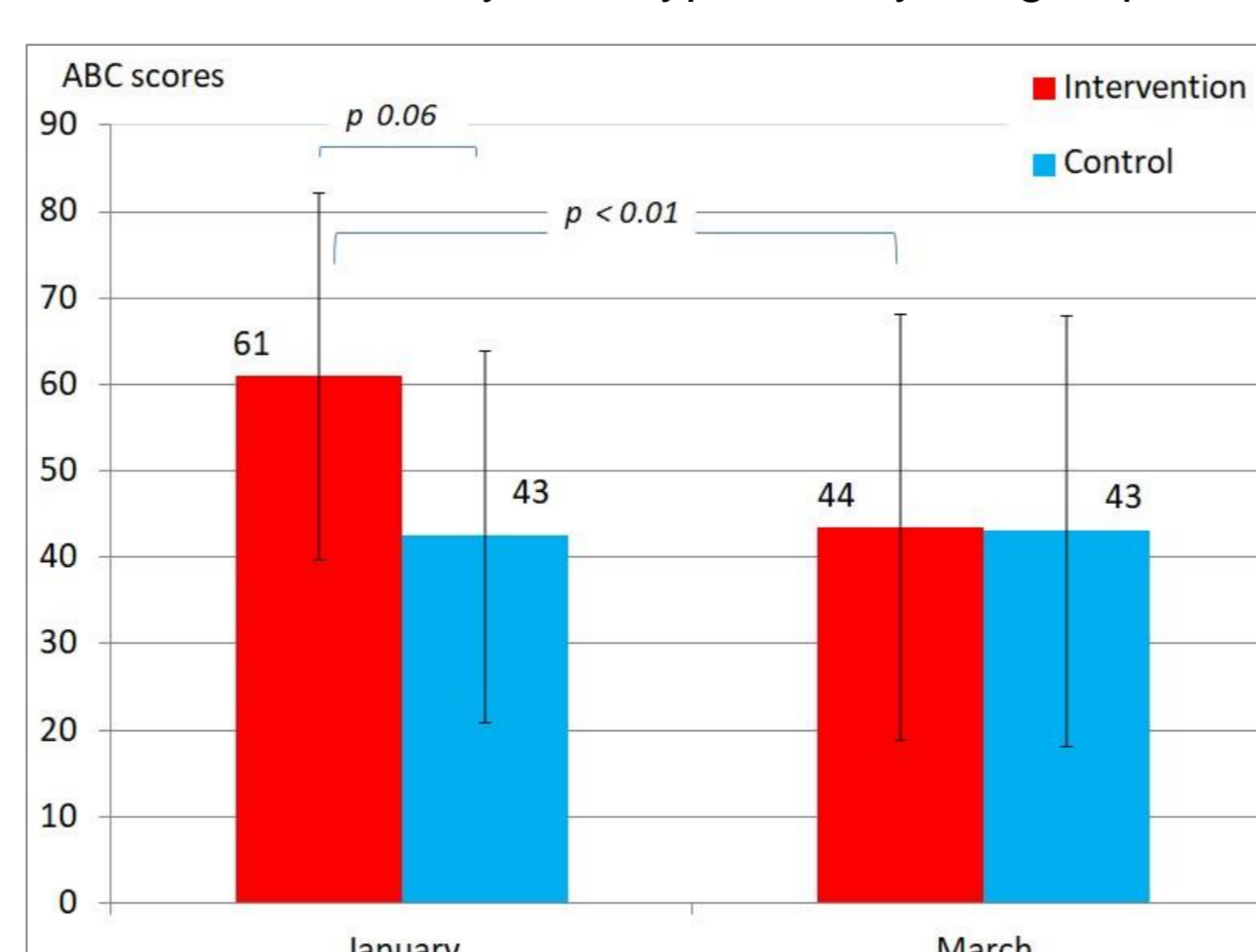
- Four subscales of symptoms were evaluated by parents at the beginning and end of the study:
  - Speech / Communication
  - Sociability
  - Sensory / Cognitive Awareness
  - Health / Physical Behaviour
- By the end of the study, overall **ATEC score decreased by 23%** in the Intervention group, with the largest improvement in Socialising and Health/Behaviour symptom subgroups



Total ATEC scores at the beginning and end of the study. Data from the ATEC (Autism Treatment Evaluation Checklist) questionnaire. Higher scores indicate greater severity. Intervention group n=10, Control group n=6. Error bars represent standard deviations

### Aberrant Behaviour Checklist (ABC)

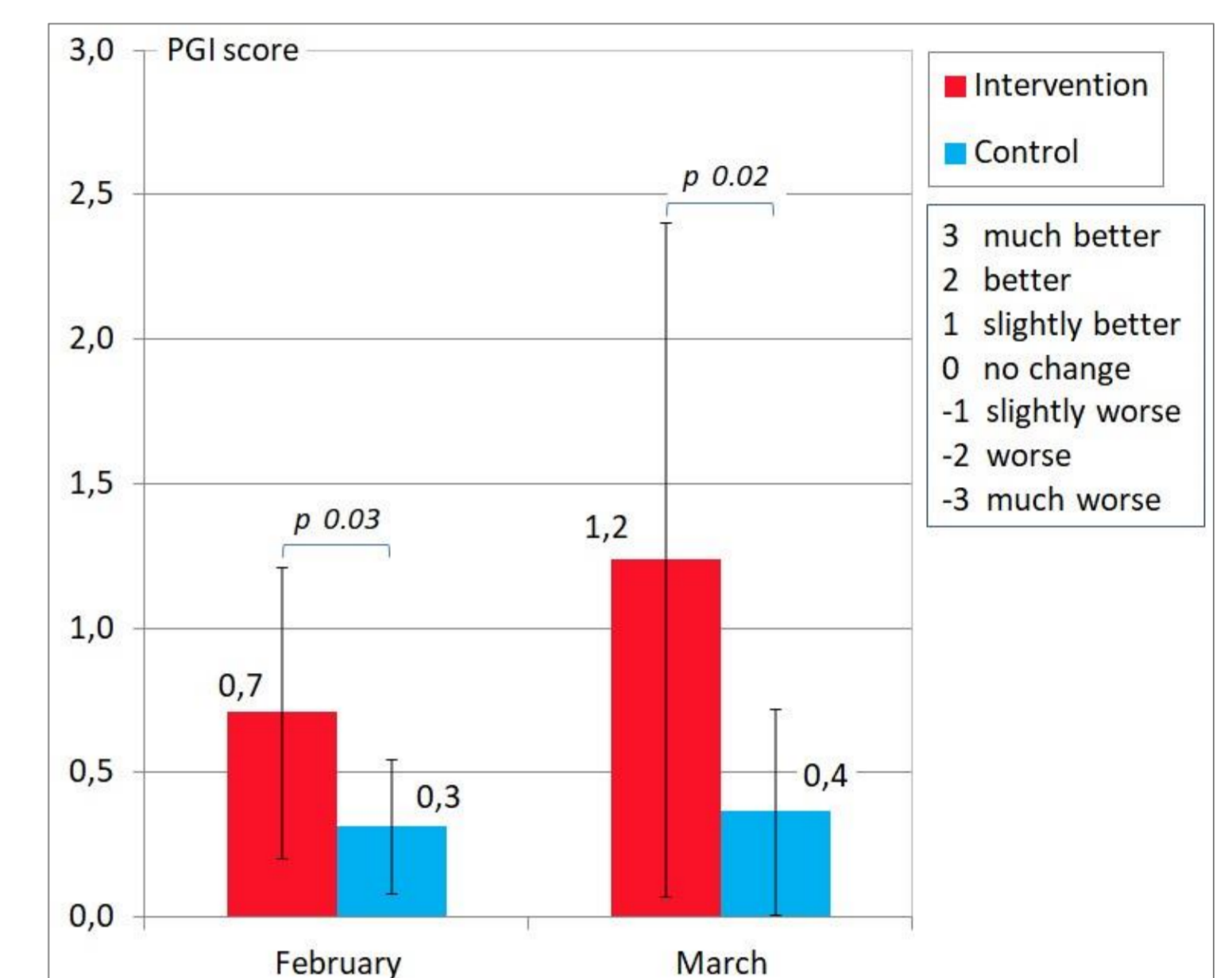
- Five subscales of symptoms were evaluated by parents at the beginning and end of the study:
  - Irritability
  - Lethargy
  - Stereotypy
  - Hyperactivity
  - Inappropriate speech
- ABC score decreased by 29%** in the Intervention group, with the largest improvement in the Irritability and Hyperactivity subgroups



Total ABC scores at the beginning and end of the study. Data from the ABC (Aberrant Behaviour Checklist) questionnaire. Higher scores indicate greater severity. Intervention group n=10, Control group n=6. Error bars represent standard deviations

### Parent Global Impressions (PGI-2)

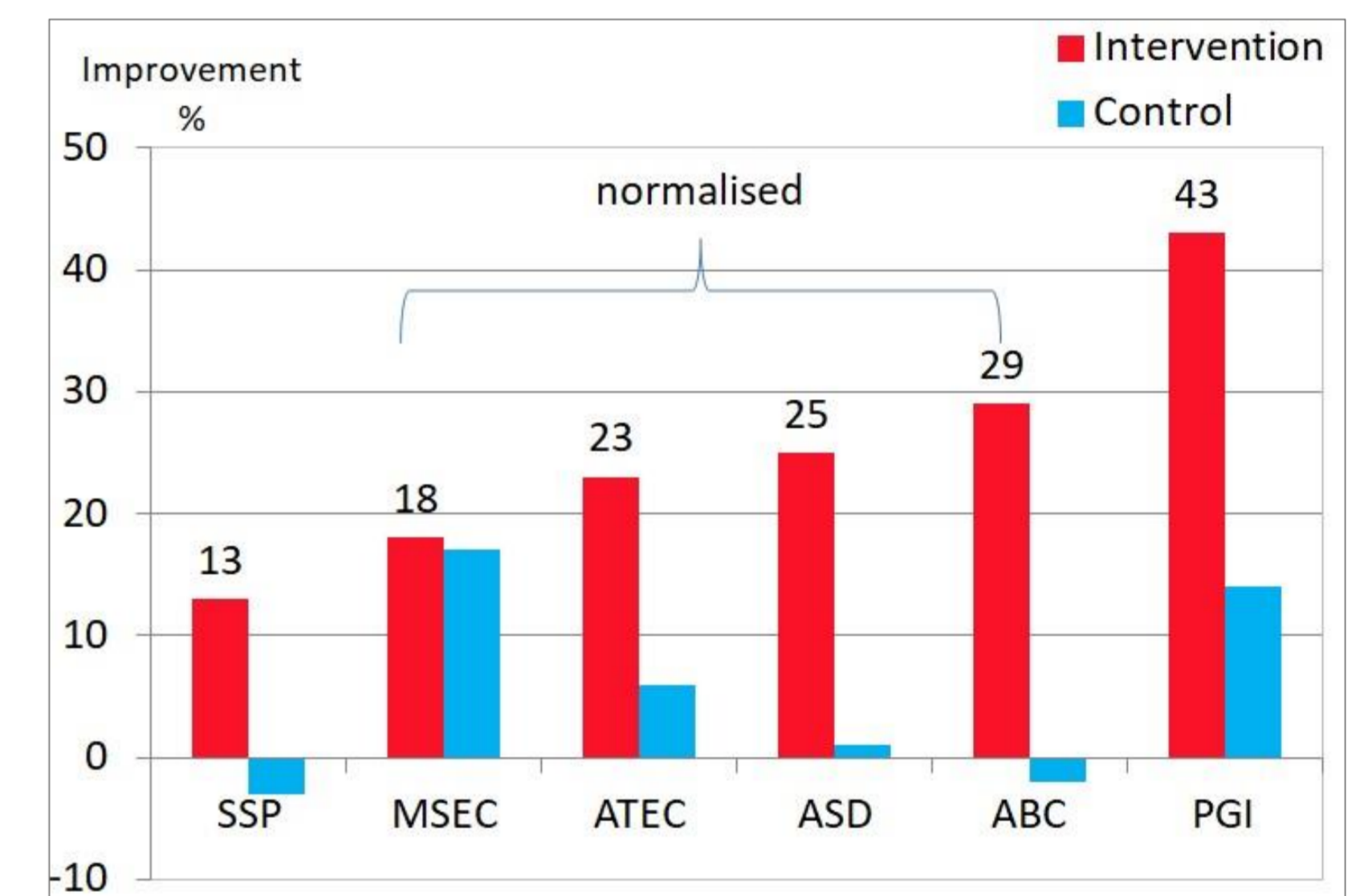
- Parents reported 40-80 % compliance with SCD/GAPS dietary guidelines
- Overall PGI-2 evaluation showed 43 % improvement in the Intervention group in comparison to the Control group (14 %)



PGI-2 scores at the beginning and end of the study. Data from the PGI-2 (Parent Global Impression – Revised-2) questionnaire. Intervention group n=10, Control group n=6. Error bars represent standard deviations

### Improvement

- Overall the Intervention group showed 13-43 % improvement during the study period (3 months)



Summary of significant changes in the evaluations of autistic symptoms of children. For SSP and PGI an increase is an improvement, for other scales (MSEC, ATEC, ASD, ABC) – decrease of score shows the improvement. For comparison in this graph scales MSEC, ATEC, ASD and ABC are normalised to the opposite improvement value. Intervention group n=10, Control group n=6

## Conclusions

- The study confirmed that SCD/GAPS diet, complemented with vitamins/minerals, can improve behaviour, reduce hyperactivity and sensory sensitivity, and improve speech perception/understanding and socialisation of children with ASD
- SCD/GAPS diet and the use of recommended vitamins/supplements could be a safe and effective approach to help reduce some symptoms of children with ASD**

## References

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