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Open-label trial of propranolol in autism spectrum disorder and effects on anxiety and GI symptoms

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OVERVIEW

- Autism spectrum disorder (ASD) is a neurodevelopmental disorder that is linked to both mood, anxiety, and gastrointestinal symptoms (GI).
- Multiple studies indicate that GI symptoms are common in those with ASD.
- Anxiety is also common in those with ASD, with almost half of those diagnosed experience high levels of anxiety or have at least one anxiety disorder.
- Studies also support the connection between anxiety, mood, and GI symptoms.
- Propranolol, a beta-blocker (i.e., blocks the effects of epinephrine and norepinephrine), has been used successfully as a treatment for anxiety.
- A randomized clinical trial was conducted to determine the potential benefits of propranolol given in serial doses
- **Data presented here are from the open label extension portion of the trial that assessed 1) the effects of propranolol on anxiety, and 2) on GI symptoms.**

METHODS

- 51 individuals diagnosed with ASD (*M* age = 14.02, *SD* = 4.7, range = 7-23, 10 females) participated in the open label portion of the study.
- Participants were involved in a 15-week double-blind study with propranolol prior to participating in the open label extension portion of the study.
- Participants took propranolol for 12 weeks in an unblinded manner (children 7-14 were titrated up according to weight; 15-23 were titrated up to 100mg).
- Clinical Global Impression of Severity for anxiety and gastrointestinal functioning were collected at baseline and again after 12 weeks of taking propranolol.
- Scores for each measure ranged from 1-6 where 1 = normal, 2 = borderline, 3 = mild, 4 = moderate, 5 = marked, and 6 = severe.
- The principal investigator of the study assessed the patient through verbal interviews with the patient and/or caregiver to obtain their overall impression of anxiety and GI symptoms.

RESULTS

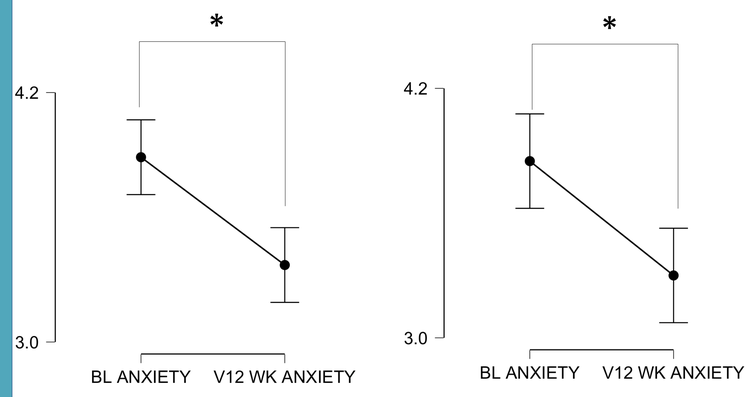

Figure 1. Descriptive plots for baseline anxiety severity and 12-week anxiety severity in children ages 7-14 (left panel) and youth ages 15-24 (right panel). Lower scores = lower anxiety severity. *$p < .05$.

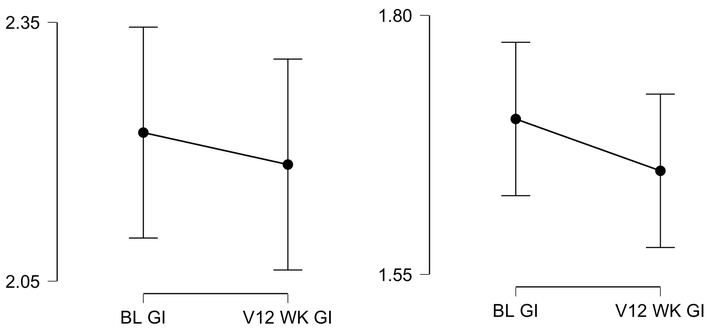

Figure 2. Descriptive plots for baseline GI severity and 12-week GI severity in children ages 7-14 (left panel) and youth ages 15-24 (right panel). Lower scores = lower GI severity.

RESULTS SUMMARY

Children 7-14 years of age

- Clinical Global Impression – Anxiety Severity
  - There was a significant decrease in anxiety severity between baseline (M = 3.92, SD = 0.89) and after 12-weeks of taking propranolol (M = 3.40, SD = 1.01), $t(46) = 5.40$, $p < 0.001$. See Figure 1.
- Clinical Global Impression – GI Severity
  - There was no significant difference between baseline (M = 2.22, SD = 1.25) and 12-week (M = 2.19, SD = 1.24) GI severity, $t(26) = 0.44$, $p = 0.663$, Cohen's $d = 0.09$. See Figure 2.

Youth 15-24 years of age

- Clinical Global Impression – Anxiety Severity
  - There was a significant decrease in anxiety severity between baseline (M= 3.85 , SD = 1.04) and after 12 weeks of taking propranolol (M= 3.3 , SD = 1.03), $t(19) = 3.58$, $p = 0.002$, Cohen's $d = 0.80$. See Figure 1.
- Clinical Global Impression – GI Severity
  - There was no significant difference in GI symptoms between baseline GI severity (M= 1.7 , SD = 1.17) and after 12 weeks of taking propranolol (M= 1.65 , SD = 1.04) , $t(19) = 1$, $p = 0.33$, Cohen's $d = 0.224$.. See Figure 2.

DISCUSSION/CONCLUSIONS

- Propranolol significantly reduced clinical global impression of anxiety severity in both children and youth with ASD.
- However, propranolol did not significantly reduce GI symptoms in either children or youth.
  - Both groups did not have significant GI troubles to begin with (i.e., children averaged in the "borderline" range and youth in the "normal" range.)
  - Future research on GI disorders in ASD should use more sensitive measures of GI functioning than Clinical Global Impression.
- These results are promising as they suggest a new potential treatment for anxiety in ASD but should be interpreted with caution given the open label nature of the study.

This work was supported by the Department of Defense (ClinicalTrials.gov Identifier: NCT02871349).