EFFECTS OF THE BETA-ADRENERGIC ANTAGONIST PROPRANOLOL ON ADAPTIVE AND PROBLEM BEHAVIOR AND RELATIONSHIP WITH HEART RATE VARIABILITY IN PATIENTS WITH AUTISM SPECTRUM DISORDER

PRESENTED BY ESIRIOGHENE EMEJE

INTRODUCTION

- Autism spectrum disorder (ASD) is a neurodevelopmental disorder that affects many individuals in the United States. ASD is characterized by persistent deficits in social communication and social interaction across multiple contexts.

- Children with ASD have high anxiety levels that affects their social communication and social interaction abilities. As such, it is important to find ways to help increase socially appropriate behavior in ASD and maximize their social communication and interaction.
- Research indicates that propranolol, a pharmaceutical drug that blocks the brain and body's use of norepinephrine both centrally and peripherally, reducing noradrenergic system activity. As a result of noradrenergic blockade, propranolol decreases blood pressure and reduces anxiety
- A previous study from our team found that a single dose of propranolol significantly increased conversational reciprocity in a sample of patients with ASD.
- Here, we examined the effects of serial doses of propranolol for 12 weeks on the effects of social severity and anxiety and fears in patients with ASD.
- Further, we examined the effects of propranolol on heart rate variability (HRV).
- **We hypothesized that propranolol would decrease both social severity and anxiety and fears while also increasing HRV.**

METHODS

- **Participants:** 51 individuals diagnosed with ASD (M age = 14.02, SD = 4.7, range = 7-23, 10 females).
- **Propranolol Administration:**
- Participants received propranolol for 12 weeks in an unblinded manner. The drug was titrated slowly to ensure it was tolerated well. Patients aged 7-14 were titrated according to weight, and those 15-24 were titrated up to 100mg as follows:
- Week 1: 40 mg propranolol (1 capsule, nightly)
- Week 2: 80 mg propranolol (2 40mg capsules, morning & night)
- Weeks 3 - 12: 100 mg propranolol (3 capsules, 40 mg/morning, 20mg/afternoon, & 40mg/night)

RESULTS

- Preliminary results indicate that anxiety reduced significantly, and social severity decreased significantly after 12 weeks of propranolol (See Figures 1 & 2).
- Heart rate variability significantly increased after 12-weeks of taking propranolol.

GRAPHS

BASELINE SOCIAL SEVERITY - 12 WEEK SOCIAL SEVERITY

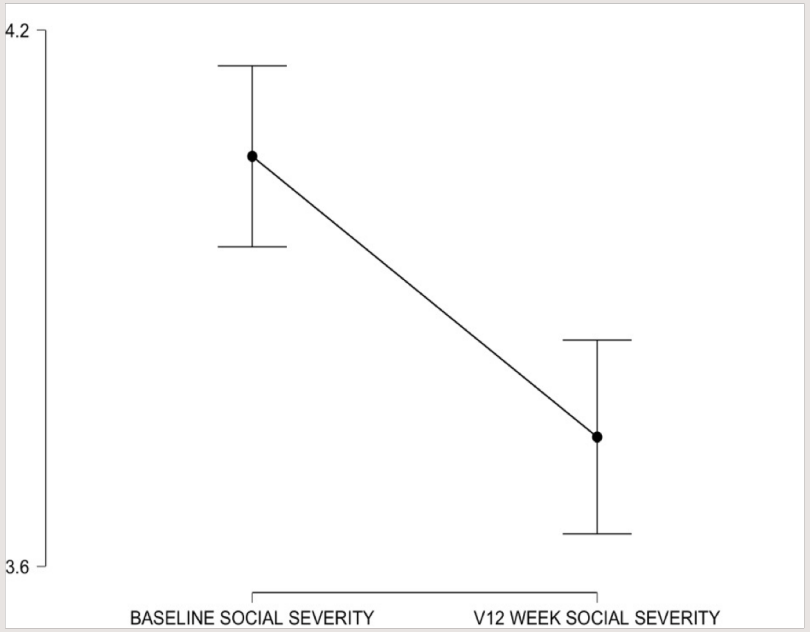

Figure 1. There was a significant decrease in social interaction severity scores between baseline ($M = 4.06$, $SD = 0.76$) compared to 12-week social interaction severity scores ($M = 3.75$, $SD = 0.82$), $t(46) = 4.47$, $p < 0.001$. See Figure 1.

BASELINE ANXIETY and FEARS - 12 WEEK ANXIETY and FEARS

Figure 2. There was a significant decrease in anxiety and fear severity scores between baseline ($M = 3.92$, $SD = 0.89$) compared to 12-week anxiety and fear severity scores ($M = 3.40$, $SD = 1.01$), $t(46) = 5.40$, $p < 0.001$. See Figure 2.

Paired Samples T-Test

		t	df	p	Cohen's d
BL_Mean RR	- 12 WEEK Mean RR	-5.001	26	< .001	-0.962
BL_Mean HR	- 12 WEEK Mean HR	4.876	26	< .001	0.938
BL_Min HR	- 12 WEEK Min HR	4.145	26	< .001	0.798
BL_Max HR	- 12 WEEK Max HR	3.845	26	< .001	0.740
BL_STD HR	- 12 WEEK STD HR	0.486	26	0.631	0.094
BL_SDNN	- 12 WEEK SDNN	-2.590	26	0.016	-0.498
BL_RMSSD	- 12 WEEK RMSSD	-2.771	26	0.010	-0.533
BL_NN50	- 12 WEEK NN50	-2.692	26	0.012	-0.518
BL_pNN50	- 12 WEEK pNN50	-2.942	26	0.007	-0.566
BL_RR Triangular Index	- 12 WEEK RR Triangular Index	-1.946	26	0.062	-0.375
BL_TINN	- 12 WEEK TINN	-2.680	26	0.013	-0.516
BL_Stress Index	- 12 WEEK Stress Index	2.816	26	0.009	0.542

Table 1. Paired Sample T between baseline and 12-week HRV parameters.

	N	Mean	SD	SE
BL_Mean RR	32	667.401	106.498	18.826
12 WEEK Mean RR	28	787.040	132.136	24.971
BL_Mean HR	32	92.212	15.274	2.700
12 WEEK Mean HR	28	78.504	14.344	2.711
BL_Min HR	32	80.396	15.920	2.814
12 WEEK Min HR	28	69.151	13.222	2.499
BL_Max HR	32	106.660	14.957	2.644
12 WEEK Max HR	28	94.465	14.869	2.810
BL_STD HR	32	4.480	2.163	0.382
12 WEEK STD HR	28	4.264	1.813	0.343
BL_SDNN	32	34.549	19.500	3.447
12 WEEK SDNN	28	44.404	23.864	4.510
BL_RMSSD	32	29.763	21.065	3.724
12 WEEK RMSSD	28	46.479	33.651	6.359
BL_NN50	32	43.563	57.129	10.099
12 WEEK NN50	28	74.571	67.167	12.693
BL_pNN50	32	11.413	15.312	2.707
12 WEEK pNN50	28	22.429	21.590	4.080
BL_RR Triangular Index	32	8.497	4.201	0.743
12 WEEK RR Triangular Index	28	9.916	4.270	0.807
BL_TINN	32	176.781	95.022	16.798
12 WEEK TINN	28	219.107	96.430	18.224
BL_Stress Index	32	16.901	9.916	1.753
12 WEEK Stress Index	28	12.186	6.933	1.310

Table 2. Means standard deviations and standard errors for HRV variables.

GRAPHS CONT....

CONCLUSION

- Preliminary analyses show that anxiety significantly decreased and social severity significantly decreased after taking propranolol for 12 weeks.
- The change in adaptive behavior and problem behavior is associated with the change in their heart rate variability.
- After taking propranolol for 12 weeks HRV significantly increased in participants.
- This indicates that participants are able to function at high levels which helps improve their quality of life and overall, makes it easier for them to function in their daily lives..