Gluten-free diet in patients with Postural Orthostatic Tachycardia Syndrome (POTS)

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Abstract

POTS (postural orthostatic tachycardia syndrome) is the most common disorder of the autonomic nervous system that can cause a wide array of symptoms, including orthostatic intolerance and gastrointestinal symptoms. These symptoms can lead to significant disability and functional impairment. Because the treatment of POTS involves both pharmacologic and non-pharmacologic approach, lifestyle changes, such as dietary modifications are essential to long-term management. Our objective is to determine whether a gluten-free diet (GFD) is beneficial for patients with POTS. Patients with POTS, confirmed either by a tilt table test or a 10-minute stand test, who followed GFD were recruited to retrospectively complete pre- and post- GFD COMPASS-31 questionnaires after GFD was initiated and maintained for at least 4 weeks. Paired-samples t-tests were conducted to compare COMPASS-31 scores before and after adopting GFD. Patient co-morbidities and self-reported improvement were also collected. All 16 patients were females, age 16-48 years (mean 33.2, SD=11.0 years), who had POTS symptoms for 1-30 years (mean 12, SD=11.2 years). Seven patients had co-morbid hypermobile Ehlers-Danlos syndrome (h-EDS), 7 had mast cell activation syndrome (MCAS), and 5 had autoimmune disorders excluding celiac disease. Pre-GFD COMPASS-31 scores (mean 57.38, SD=12.65) were significantly higher than post-GFD scores (mean 37.37, SD=14.18, t(15)=-7.89, p<0.0001), with considerable improvements noted in the gastrointestinal symptom (pre-GFD mean 12.83, SD=4.41; post-GFD mean 7.70, SD=4.48; t(15)=-4.46, p=.00046) and orthostatic intolerance (pre-GFD mean 31.50, SD=6.18; post-GFD mean 18.88, SD=8.33; t(15)=-6.37, p=.00001) domain scores. All patients reported improvement in POTS on GFD with mean improvement 49% (range 10-99%). There was a mean reduction in total COMPASS-31 scores by 20.01 points (35.58%) in our study, compared to a reduction of 6.58 points (13.10%) in POTS patients on a high sodium diet and pharmacotherapy as determined by a prior study (Dipaola F. et al, Int. J. Environ. Res. Public Health 2020: 17: 5872). GFD appears to be effective at decreasing the symptom burden in patients with POTS, particularly in the gastrointestinal and orthostatic intolerance symptom domains. Large prospective studies are necessary to confirm whether GFD is an effective long-term treatment option for patients affected by this chronic and disabling condition.

Introduction

- POTS is a heterogeneous disorder of the autonomic nervous system (ANS) consisting of postural tachycardia with associated symptoms of orthostatic intolerance.[1]
- Clinical symptoms include lightheadedness, dizziness, shortness of breath, headache, fatigue, palpitations, and presyncope.[1]
- Additionally, many POTS patients experience significant gastrointestinal symptoms, such as nausea, vomiting, constipation, diarrhea, bloating, and abdominal pain.[2]
- At least 25% of POTS patients are unable to work or attend school due to debilitating symptoms.[3]
- Some studies have found a possible increased prevalence of celiac disease and gluten sensitivity among POTS patients.[4,5]
- We sought to determine whether gluten-free diet (GFD) is effective in reducing the symptoms of POTS.

Methods

A. Patients with POTS diagnosed via a tilt table test (TTT) or 10-minute stand test who followed a GFD for at least 4 weeks were recruited from Dysautonomia Clinic.

INCLUSION CRITERIA:

A. Sustained heart rate increase of ≥ 30 bpm within 10 minutes of assuming upright posture or on a TTT.
B. Symptoms of orthostatic intolerance present for ≥ 6 months.
C. No history of celiac disease.

B. Patients completed COMPASS-31, a validated questionnaire designed to assess the autonomic symptoms, retrospectively for their symptoms before starting GFD and for symptoms after maintaining GFD for at least 4 weeks.[6]
C. Paired-samples t-tests were conducted to compare COMPASS-31 scores before and after adopting GFD.
D. Patient co-morbidities and self-reported improvement were also collected.

Results

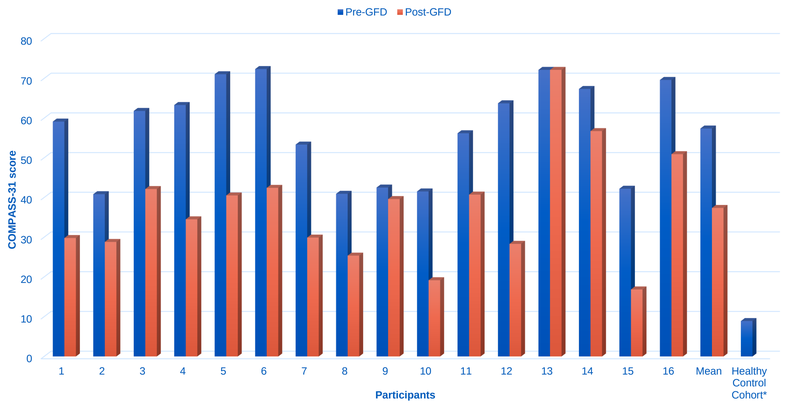
Table 1. Clinical Characteristics

Participant	Age	Diagnoses	Duration of Symptoms (years)	Duration of GFD	COMPASS 31 Score Difference Δ	COMPASS 31 % Reduction	% Self-Reported Improvement
1	47	POTS, MCAS, Hashimoto's disease, delayed pressure urticaria, autoimmune autonomic neuropathy	23	7 years	29.34	49.62	20%
2	19	POTS, chronic fatigue syndrome, anxiety, depression	1	1 month	12.04	29.49	10%
3	41	POTS, MCAS, migraine w/ aura, GERD, IBS	6	7 years	19.68	31.84	40%
4	18	POTS, Irlen syndrome	1	1.25 years	28.80	45.50	40%
5	16	POTS, asthma, allergic rhinitis	1	1 month	30.54	42.97	60%
6	37	POTS, MCAS, cold urticaria, cardiogenic syncope w/ PMS, IgM agiobulinemia, enterogastric reflux, pyloric stenosis, Raynaud's, rosacea	1	5 months	29.93	41.36	80%
7	31	POTS	3	2.5 years	23.44	43.94	60%
8	28	POTS, Kawasaki disease, asthma	2	1.5 years	15.57	38.05	30%
9	45	POTS, asthma, hypermobile EDS, fibromyalgia, depression, anxiety, GERD, IBS, PCOS, eczema, OSA, iron deficiency anemia	25	15 years	2.90	6.81	99%
10	28	POTS, hypermobile EDS	13	4 years	22.36	53.85	70%
11	18	POTS, EDS	4	4 months	15.45	27.51	10%
12	43	POTS, MCAS, EDS, small fiber neuropathy, IBS	18	10 years	35.41	55.56	60%
13	48	POTS, MCAS, EDS	10	1 year	0.00	0.00	80%
14	40	POTS, MCAS, EDS, Sjogren's syndrome, chronic pain, migraines, Tarlov cysts, keratoconus	27	4 years	10.61	15.76	50%
15	37	POTS, hyperirritable larynx syndrome, colonic polyps	>26	6.5 years	25.36	60.08	35%
16	35	POTS, EDS, hypokalemic peridic paralysis, Hashimoto's thyroiditis	30	10 years	18.70	26.86	45%
Mean	33.19	----	11.94	4.4 years	20.01	35.58	49.31%

Table 2. Mean COMPASS-31 domain scores before and after GFD

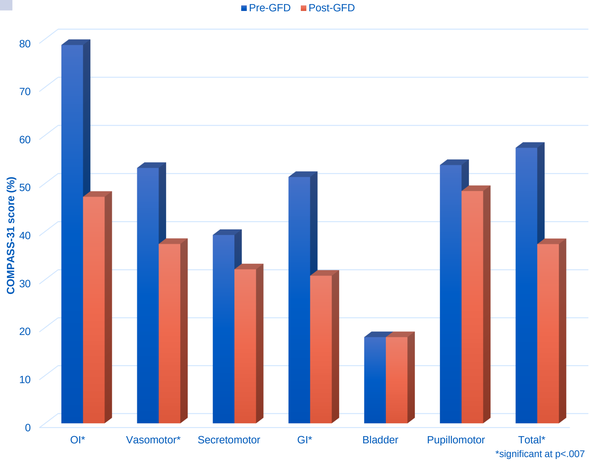
COMPASS-31 Domain	Mean (SD) pre-GFD	Mean (SD) post-GFD	t(15)	p
Orthostatic Intolerance	31.50 (6.18)	18.88 (8.30)	-6.37	<.0001
Vasomotor	2.66 (1.81)	1.87 (1.38)	-3.18	.006
Secretomotor	5.89 (4.32)	4.82 (3.87)	-1.93	ns
Gastrointestinal	12.83 (4.41)	7.70 (4.48)	-4.46	.0005
Bladder	1.80 (2.66)	1.80 (2.56)	0.00	ns
Pupillomotor	2.69 (1.17)	2.42 (1.34)	-1.07	ns
Total Score	57.38 (12.65)	37.37 (14.18)	-7.89	<.0001

Figure 1. COMPASS-31 scores before and after GFD



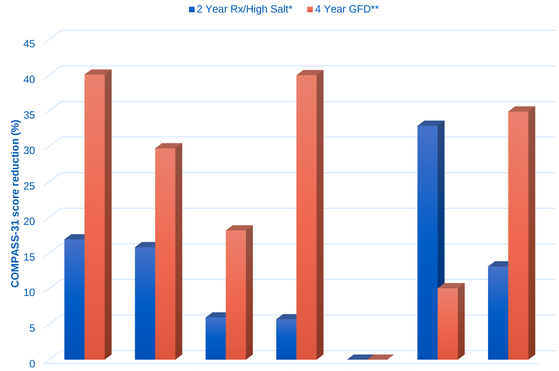
*Cohort of 30 healthy female controls, mean age 41.1 with no rheumatologic or autonomic disorders who completed COMPASS-31 as part of a different study, presented as healthy mean COMPASS-31.[7]

Figure 2. Mean COMPASS-31 domain scores (%) before and after GFD



*significant at p<.007

Figure 3. % reduction in COMPASS-31 scores with mean duration 4.4 years GFD vs. 2 years pharmacotherapy + high sodium diet



*Cohort of 12 POTS patients, mean age 42, who completed COMPASS-31 as part of a different study where patients were treated with pharmacotherapy and a high sodium diet.[8]

**Based on mean duration of 4.4 years (range 1 month – 15 years) GFD in our study.

Conclusion

- Pre-GFD COMPASS-31 scores were significantly higher than post-GFD scores with a mean reduction of 20.01 points (from average score of 57.38 pre-GFD to 37.37 post-GFD).
- Considerable improvements were noted in the orthostatic intolerance, vasomotor, and gastrointestinal domains with significance at p<.007.
- All patients reported improvement in POTS on GFD with mean improvement 49% (range 10-99%).
- There was a mean reduction in total COMPASS-31 scores by 35.58% in our study, compared to a reduction of 13.10% in POTS patients on a high sodium diet and pharmacotherapy as determined by a prior study.[8]
- Results indicate potential link between gluten consumption and POTS pathophysiology, possibly via inflammatory pathways.
- Large prospective studies are necessary to confirm whether GFD is an effective long-term treatment option for patients affected by this chronic and disabling condition.

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