A pilot study of the effects of whole food supplements on Adrenal Fatigue Syndrome

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A senior research project submitted in partial requirement
for the degree Doctor of Chiropractic

August 11, 2014

ABSTRACT

Background: There is abundant evidence to establish that stress is related to many of the chronic diseases people suffer from today. The hypothalamic-pituitary-adrenal axis is the primary system for responding to stress. Chronic stress can fatigue the adrenal gland to the point where it can no longer deal with stress effectively, giving rise to a spectrum of stress-related symptoms, such as fatigue, body aches, nervousness, sleep disturbance, and digestive problems. Although not accepted as a specific medical diagnosis, adrenal fatigue syndrome (AFS) is a frequently occurring condition without an evidence-based treatment. It can be argued that a regimen of glandular and vitamin supplementation to support adrenal function may improve symptoms of AFS; therefore this study will investigate the effects of Standard Process Drenamin and Cataplex-C whole food supplements on adrenal function and perceived stress.

Methods: This project was approved by the Logan University IRB. Eighty-five volunteer participants completed the Perceived Stress Scale (PSS) questionnaire, 30 subjects were selected based on their initial scores of 22 or higher. Chosen participants completed a 30-day supplementation protocol of Standard Process Drenamin and Cataplex C. Stress surveys were completed on day 1 and day 30 of supplementation. Researchers performed Ragland's Postural Hypotension Test and measured Paradoxical Pupillary response on day 1 and day 30.

Results: Twenty-six participants competed the trial, 16 females and 10 males ranging from 20-34 years old (the average age= 24.6 years old), were collected on pre and post measurements of Blood Pressure, Pupillary Response, PSS A&B, System Survey, Fatigue, Stress Rating Scale (SRS), Anxiety, Depression, and Sleep Disturbance. Significant decreases were found for PSS A, System Survey, PSS B, Fatigue, Anxiety, Depression, and Sleep Disturbance; and a significant increase was found for SRS.

Conclusion: Four weeks of whole foods supplementation with Standard Process Drenamin and Cataplex C had a positive effect of symptoms of AFS. Statistically significant improvements were found for 9 out of 10 outcome measures. Considering the possible benefits of a safe and effective treatment for AFS, further investigation with double blind randomized controlled trial is recommended.

Key words: adrenal fatigue syndrome, supplementation, diagnosis, vitamin therapy, glandular supplements

INTRODUCTION

"Current research indicates that millions of individuals are suffering from stress-related illnesses. These illnesses may include hypertension, cardiovascular disease, cancer, headaches, depression, chronic fatigue and fibromyalgia, which are more prevalent in today's world. Adrenal stress/fatigue is frequently the underlying cause of all of these conditions." [1] Researcher, G.E. Poesnecker, states "When the body is called upon to respond to stress, the adrenal gland is its' primary agent." [2]

Adrenal fatigue is a physiological response of prolonged emotional, physiological and/or psychological stressors that lead to dysfunction of the hypothalamic-pituitary-adrenal axis (HPA axis). The HPA axis is responsible for the physiological response to stressful stimuli. When a stressful stimulus is present the hypothalamus signals the pituitary gland to release adrenocorticotrophic hormone (ACTH). ACTH then signals the adrenal medulla to secrete epinephrine and norepinephrine while also stimulating the adrenal cortex to release cortisol. Normally, cortisol should shut off the stress response but with chronic stress cortisol's inhibitory feedback is diminished. Without negative feedback the HPA axis cascade continues and results in overproduction of epinephrine, norepiphrine and cortisol, eventually leading to adrenal resistance or adrenal fatigue and the underproduction of adrenal hormones.[3] Symptoms of adrenal fatigue include mental fog or inability to stay focused, insomnia, sleep disturbances, food cravings, weight changes, feelings of anxiety and lack of stamina, frequent infections or illnesses, compromised immunity, perimenopausal or premenstrual hormonal changes, and many other overlapping conditions.

Research on adrenal fatigue and its pathophysiology is unfortunately lacking. There is not yet a consensus among health physicians on the process of the disease, proper diagnostic procedures, and effective treatments of the adrenal fatigue. Since the symptoms of adrenal fatigue are very broad and can overlap with other disorders diagnosing adrenal fatigue can be challenging. Currently, salivary testing is the most commonly used test to diagnosis adrenal fatigue. Salivary testing involves measuring the levels of cortisol at four different and specific times a day. Another way to test and diagnosis adrenal fatigue is through blood testing. Blood tests can reflect the patient's current cortisol and electrolyte levels. Often with adrenal fatigue serum sodium will be deficient and potassium will be in excess. Salivary cortisol testing offers a painless and easier option for the patient when compared to measuring cortisol through the blood therefore making it the first line parameter for diagnosing adrenal fatigue. [4]

When treating adrenal fatigue nutrition, diet, and lifestyle must all be taken into account. Some things a patient can do for themselves to treat their adrenal dysfunction is to ensure they are getting plenty of sleep. According to the CDC, 7-8 hours of sleep is recommended for adults.[5] Another important facet to treating adrenal fatigue is maintaining normal blood glucose levels. Cortisol, a hormone produced by the adrenal glands, is responsible for raising blood sugar specifically in times of stress and when called upon by the presence of low blood sugar the adrenal gland is further fatigued. It is recommended that patients who are suffering from adrenal fatigue avoid alcohol, caffeine, and tobacco since these substance are all toxic to the adrenal glands. [6] Lastly, with proper supplementation the adrenal gland can be supported and protected from excessive stress. Recommended supplementation to treat adrenal fatigue is desiccated

adrenal gland also known as raw adrenal glandular. Adrenal glandular supplementation supports adrenal gland function and relieves excess stress put on the gland. [6]

Through the supplementation of whole food ingredients, supportive vitamins and adrenal glandular extracts, research suggests effects of improved adrenal function. The supplement Drenamin contains desiccated bovine adrenal gland, which helps to restore normal adrenal function and enhance adrenal repair and activity. The supplement Cataplex C is another supplement which will support the adrenals. Cataplex C's main ingredient is vitamin C which is an antioxidant responsible for supporting the immune system when coping with stress.[2]

For this study, research participants will be chosen according to their numerical scores from the Perceived Stress Scale (PSS). The survey has been proven to be reliable indicators of stress and the individuals copping abilities. According to the Journal of Health and Social Behavior, "The Perceived Stress Scale is suggested for examining the role of nonspecific appraised stress in the etiology of disease and behavioral disorders and as an outcome measure of experienced stress levels." [7] The test shows adequate reliability and correlates with physiologic disturbances resulting from stress in one's life. Individual measurements will aid in determining appropriate subjects for the study, who may be suffering with adrenal fatigue.

Clinical implications for the use of Ragland's test for adrenal hypo-function state, "The autonomic nervous system control of pressure changes in the vascular system becomes compromised as adrenal output is diminished in adrenal hypo-function and exhaustion." Paradoxical Pupillary Response test determines the presence and severity of adrenal fatigue by activating the autonomic regulation of pupillary constriction. When the

adrenal system is compromised the pupil fails to constrict and dilation occurs, thus indicating adrenal fatigue or exhaustion.[8]

Materials and Methods

Participants:

This study was approved by the Logan University, College of Chiropractic Institutional Review Board. Written informed consent was obtained from all participants. Eighty five individuals were recruited and completed the Perceived Stress Scale questionnaire. Inclusion criteria were Logan students, male and female, between the ages of 18 -35 who scored 15 or higher on the Perceived Stress Scale. A convenience sample of 30 participants was selected from the student population at Logan University. Any subjects who were taking medication for blood pressure, anxiety or depression, or experiencing heart, kidney, thyroid, chronic illness, lung or neurological diseases were excluded from the study. Women who were currently pregnant or breastfeeding were also excluded from the study.

Study Protocol:

The study design was a one group, repeated measures clinical trial. Participants followed their normal dietary habits for 4 weeks including Standard Process supplements (3) Drenamin and (3) Cataplex C tablets, twice daily. Participants were given verbal and written instructions for proper supplementation. Ragland's Postural Hypotension test and Pupillary Response Reflex test were used during this adrenal fatigue study to measure the effects of supplementation (See Appendix A). Supine/standing blood pressures and pupillary response reflexes were measured and recorded on Day 1 and Day 30 of the study. Participants were instructed to lie supine for 2 minutes on a treatment table before

their blood pressure measurement was taken. The digital blood pressure cuff was placed on the left upper arm, 2 inches above the brachial artery. Blood pressure was taken using a digital blood pressure monitor by a trained student researcher. Following the supine measurement, the participant was instructed to stand quickly from the supine position with the blood pressure cuff still in place. The blood pressure measurement was repeated. Both blood pressure measurements were recorded.

The participants then proceeded to have their pupillary response read. In a dark room, the participants waited for 15 seconds to allow their eyes to accommodate. The participants were instructed to look at a fixed point and not blink. The trained researcher directed the pen light at the pupil approximately at a 45 degree angle. The light was held 6-12 inches from the patient's eye. The reaction of the pupil was observed for 20 seconds. Results for the pupillary response reflex were graded as excellent, fair, poor, failure or exhaustion (See Appendix B).

On Day 1, participants also completed the Measurement of Stress Related Symptoms Survey. Following the completion of the above criteria, participants received one bottle of Standard Process Drenamin and Cataplex C each. On day 30, participants returned to have their blood pressure and pupillary response reflexes observed again. The results from both the Ragland's Postural Hypotension test and Pupillary Response Reflex tests were recorded and compared to the results from Day 1. Participants also completed the Perceived Stress Scale and Measurement of Stress Related Symptoms Survey on Day 30.

Standard Process Supplements:

Standard Process provided the study participants with (2) bottles of supplements Drenamin and Cataplex C at no cost to the subjects. Each participant was given verbal and written instructions for supplementations throughout the entire study. Participants

are instructed to take Standard Process (3) Drenamin and (3) Cataplex C supplements in the morning and (3) Drenamin and (3) Cataplex C supplements in the evening starting Day 1. Participants were instructed to continue to take a total of 12 Standard Process supplements (6) Drenamin and (6) Cataplex C each day for a duration of consecutive 30 days.

Results

Data from 26 subjects, 16 females and 10 males (range 20-34 yoa, mean age= 24.6, SD = 3.7) were collected on pre and post measurements of Blood Pressure, Pupillary Response, PSS A&B, System Survey, Fatigue, Stress Rating Scale (SRS), Anxiety, Depression, and Sleep Disturbance. Significant decreases were found for PSS A, System Survey, PSS B, Fatigue, Anxiety, Depression, and Sleep Disturbance; and a significant increase was found for SRS.

Table 1: Pre/Post Measurements for AFS outcome measures

	Pre Measurement (Mean ± SD)	Post Measurement (Mean ± SD)	Paired Difference (95% CI)	p-value
Standing Systolic BP	121.3 ± 10.9	119.7 ± 12.1	1.65 (-3.78, 7.09)	.537
Standing Diastolic BP	77.2 ± 10.8	79.5 ± 12.6	-2.38 (-7.38, 2.61)	.335
Pupillary Response Excellent Failure Fair Poor	3 (11.5%) 2 (7.7%) 14 (53.8%) 7 (26.9%)	9 (34.6%) 0 (0.0%) 15 (57.7%) 2 (7.7%)	*	.044*
PSS A	24.7 ± 2.3	19.0 ± 3.7	5.6 (3.8, 7.4)	<.0001
System Survey	38.5 ± 10.6	29.6 ± 7.3	9.0 (5.7, 12.2)	<.0001
PSS B	8.8 ± 1.2	7.7 ± 1.4	1.2 (.4, 2.0)	.004
Fatigue	26.4 ± 5.9	17.0 ± 5.5	9.4 (6.6, 12.1)	<.0001
SRS	6.7 ± 1.8	8.0 ± 1.5	-1.3 (-1.8, -.69)	.0001
Anxiety	20.2 ± 7.6	13.0 ± 4.3	7.3 (4.3, 7.5)	<.0001
Depression	12.4 ± 7.2	9.7 ± 4.1	2.7 (1.2, 4.3)	.001
Sleep Disturbance	24.0 ± 6.2	18.8 ± 6.8	5.2 (2.2, 8.2)	.001

Paired t-tests were used for continuous variables, and McNemar's Chi-Square test was used for categorical variables (*).

DISCUSSION

The data analysis provides strong evidence that Adrenal support supplementation had a positive effect on decreasing symptoms of AFS. Participants were asked to comment on their experience while supplementing and 17 of the 26 participants provided feedback. Of the 17 participants, 7 participants reported improved fatigue and increased energy, 6 participants reported improved sleep habits, 4 reported decreased anxiety and 5 reported trouble falling asleep with supplementation.

Gromova et al.[9] showed that supplementation of ascorbic acid (Vitamin C) improved capacity of the adrenal glands to adapt to surgical stress by normalizing cortisol and ACTH levels. It is hypothesized by endocrinologists that glandular therapy works by "providing nutrients the body lacked. Once supplied with the missing nutrients, the malfunctioning organ is able to repair itself and function properly."[6] Results of the current study show that participants experienced improvement in 9 of the 10 AFS symptoms measured after 4 weeks of supplementation with Drenamin and Cataplex C.

Limitations of the study include: 1.The participants were all young, relatively healthy individuals and a more diverse population including wider age and health parameters would be more generalizable; 2. While participants verbally reported a high level of compliance with the treatment, it is impossible to know whether each subject followed the treatment protocol properly for the entire 30 day duration of the study; 3. 8 of the 10 outcome measures were self-report instruments, which can be subject to expectancy effects.

CONCLUSION

Four weeks of whole foods supplementation with Standard Process Drenamin and Cataplex C had a positive effect on AFS symptoms. Statistically significant improvements were found for 9 out of 10 outcome measures. Considering the possible benefits of a safe and effective treatment for AFS, further investigation with a double blind randomized controlled trial is recommended.

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APPENDIX A: Data Analysis and Testing Procedure

Ragland's Postural Hypotension Test

Discussion: Ragland's test for postural hypotension is used to determine the presence and severity of adrenal exhaustion

- It assesses the body's ability to compensate from hydrostatic effects of gravity by measuring a drop in systolic blood pressure from a recumbent to a standing position.
- Standing from a recumbent position causes pressure changes in the vascular system which are controlled by splanchnic veins.
- The splanchnic veins, devoid of valves, are dependent upon nerve function, for their tone.
- The tone of splanchnic nerves is under the direct control of the adrenal system.

When would you run this test?

- To check a patients adrenal status

Directions:

1. Instruct the patient to lay supine on the treatment table
2. Place the blood pressure cuff on the arm of choice, determine the systolic pressure and release the pressure
3. Pump up the cuff again 15mmHg higher than supine systolic pressure and while supporting their arm, instruct the patient to stand up quickly
4. Immediately release the valve so that you can determine the standing systolic pressure within 5 seconds of the patient arising.
5. The test may be conducted sitting to standing by the BP may not drop as dramatically. Results may be halved.
6. You may want to repeat the standing BP after one minute to see how they are compensating

Result parameters for Ragland's Test

Result	Description	Implication
Excellent	6-10 point increase in systolic blood pressure upon standing	An optimal response- good adrenal health. Consider that this may be actually the beginning of the alarm stage of adrenal exhaustion. The patient is compensating okay but in early stages of decompensation. If this continues you may see a BP drop
Fair	Systolic pressure remains the same	Fair adrenal compensation
Poor	Systolic pressure drops up to 10 points	Beginning to see long term dysfunction
Failure	Systolic pressure drops up to 20 points	Adrenal Fatigue
Exhaustion	Systolic pressure drops over to 20 points	Adrenal Fatigue probably very pronounced Repeat standing BP after one minute to see if there is additional compensation to bring BP under control. Some will decrease further, which is a problem.

Clinical Implications

Clinical Implication	Additional Information
Adrenal hypofunction	The autonomic nervous system control of pressure changes in the vascular system becomes compromised as adrenal output is diminished in adrenal hypofunction and exhaustion

Interfering Factors

1. Neuropathic hypotension from neurological and other diseases (e.g. DM) can cause orthostatic hypotension
2. Decreased blood volume and anemia
3. Drugs and disease that interfere with the autonomic regulation of vascular pressure changes

Related Tests

- Urine adrenal stress test (urine chloride)
- Paradoxical Pupillary Response Test
- Adrenal Stress Index test (salivary measurement of cortisol and DHEA levels over a 24 hour period)

APPENDIX B: Data Analysis and Testing Procedure

PARADOXICAL PUPILLARY RESPONSE TEST

The paradoxical pupillary response test is used to determine the presence and severity of adrenal exhaustion

- The test is used to determine the presence and severity of adrenal exhaustion.
- Test measures the ability of the pupil of the eye to respond to light.
- A reduced ability of the pupil to constrict with light stimulus is a reflection of the "tug of war" between the sympathetic and parasympathetic branches of the autonomic nervous system
- Pupillary constriction is strongly influenced by the hormonal cascade from the adrenal system

When would you run this test?

- To check a patients adrenal status

Directions

1. Darken the room and wait 15 seconds
2. Instruct the patient to look at a fixed point and not blink
3. Come in from the side of the eye and direct the pen light at the pupil at approximately a 45 degree angle. Hold the light 6-12 inches from the patient's eye depending on the intensity of the light
4. Observe the reaction of the pupil for 20 seconds

Results

Result	Description	Implication
Excellent	Pupil constricts and holds tight for 20 seconds without pulsing	An optimal response- good adrenal health
Fair	Pupil holds but pulses after 10 seconds	Fair adrenal compensation
Poor	Pupil pulses and becomes larger after 5-10 seconds	Beginning to see long term adrenal dysfunction
Failure	Pupil pulses and becomes gradually larger over the first 10 seconds	Adrenal fatigue
Exhaustion	Pupil immediately becomes larger or fails to constrict	Adrenal fatigue probably very pronounced

Clinical Implications

Clinical Implication	Additional Information
Adrenal hypofunction and exhaustion	The autonomic nervous system control of the pupil's ability to react to light become compromised as adrenal output is diminished in adrenal hypofunction and exhaustion.

Interfering Factors

1. Drugs and neurological dysfunction can interfere with the autonomic regulation of pupillary constriction in response to light

Related Tests

- Urine adrenal stress test (urine chloride)
- Ragland's Postural Hypotension Test
- Adrenal Stress index test (salivary measurement of cortisol and DHEA levels over a 24 hours period)