BIOLOGICALLY ACTIVE COMPOUNDS LIKE ASHWAGANDHA AND GINSENG WORK AS STRESS RELIEVERS AND ALTERNATIVES TO ANTIDEPRESSANTS

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ABSTRACT: With 77% of Americans experiencing stress related symptoms on a daily basis, stress management has become a serious issue (NIMH, 2018). The most common course of treatment for stress management is to prescribe antidepressants. However, antidepressants are known to have a long list of possible side effects that can do more harm than good. Some common side effects of antidepressants include nausea, weight gain, fatigue, insomnia, and blurred vision (Robinson, 2020). As a result, researchers have started to experiment on the role of adaptogens, which are plant derived compounds, in stress management, as they are known to have stress relieving properties. While experimentation is still underway, researchers have concluded that there is "little evidence to suggest that adaptogens can cause immediate side effects" which signifies that adaptogens could be a better form of stress management treatment than antidepressants (Gannon, 2019). This paper focuses on comparing and analyzing the data of two commonly used adaptogens, ashwagandha and ginseng, in stress management using three different stress test scores. The results showed a decrease in stress levels in participants who consumed both ashwagandha and ginseng regularly. However, there were more significant decreases in stress in the group that consumed ashwagandha, which showed that ashwagandha is more effective in reducing stress levels in the body. For example, the group that consumed ginseng showed a statistically significant reduction in the Perceived Stress Score (PSS) test score of 27%. On the other hand, the group that consumed ashwagandha showed a statistically significant 41% reduction in HAM-A scores and a statistically significant 30% reduction in DASS-21 scores. These results provide insight into another possible treatment for stress management that focuses on a natural alternative to pharmaceuticals.

Keywords: Ashwagandha, Ginseng, Ayurvedic Medicine, Stress Relief

Introduction

Stress is becoming increasingly harder to manage with 44% of Americans reporting that their stress has increased over the past five years (Yaribeygi et al. 2017). There are two main categories of stress which are called internal and external stress. Internal stress is defined as the thoughts and feelings we have that may contribute, or lead , to our stress. External stress is defined as events or situations that directly affect you and cause stress. Some stress can be good for us, like when our body is preparing to face a threat. However, when our body doesn't receive the signal to go back to normal functioning there is a buildup of stress that can lead to chronic stress (NIMH, 2018). Chronic stress interferes with the immune, digestive, cardiovascular, sleep, and reproductive systems (Yaribeygi et al. 2017). The continued strain on a person's body can lead to serious health issues such as heart disease and high blood pressure, and mental disorders such as depression or anxiety (Yaribeygi et al. 2017).

Prior studies show that there is a wide range concerning the causes of stress. Something as simple as a change in our daily routine or

a change in our diet can cause stress. In most cases the cause of stress can be determined by both the severity and the frequency of an event (NIMH, 2018). Overall, anything that affects the natural balance of hormones in our body can be defined as stress. Some of the major causes of stress include chronic illnesses, emotional turmoil, and financial responsibilities (NIMH, 2018). In terms of dealing with stress, studies show that there are mechanisms in place to help us deal with both internal and external stressors. These mechanisms are controlled by the hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic nervous system and are known as the stress response (NIMH, 2018). The HPA axis is an interactive neuroendocrine unit that is in charge of releasing cortisol, which is known as the "stress hormone" as prolonged levels of cortisol have been directly linked to high stress levels. Together, the main job of the HPA axis and the sympathetic nervous system is to maintain homeostasis in the body. Homeostasis refers to the body's ability to respond to stimuli and maintain a state of balance in the body that is essential for proper functioning (Yaribeygi et al. 2017). However, chronic stress has been linked to a dysfunctional HPA axis, meaning the human body's natural way of dealing with stress has been damaged. The most common course of treatment for this is to administer antidepressants known as selective serotonin reuptake inhibitors (SSRIs) that work as anti-stress drugs (NIMH, 2018). However, SSRIs have an extensive list of possible side effects that include nausea, vomiting, insomnia, dizziness, and many others (NIMH, 2018).

In response to the possible side effects that SSRIs and other drugs can have on our bodies, researchers have begun to study the effects of adaptogens on stress management. Adaptogens date back to ancient Indian and Chinese civilizations and have been used in ayurvedic and other traditional medicines for their rejuvenating properties (Robinson, 2019). Adaptogens include several plants or herbs and are defined as "biologically active, medicinal plant substances" that help your body adapt or adjust to stress (Baek et al. 2019). Studies show that adaptogens have the ability to improve the body's nonspecific resistance to internal and external stressors, normalizing body functions, and maintaining homeostasis (Robinson, 2019). The primary effects of adaptogens include increased energy circulation, decreased perceived stress, increased resistance to stress, improved mental performance, and improved sleep (Baek et al. 2019). Each of these effects are observed with adjustment of the HPA axis, which indicates that adaptogens regulate the HPA axis pathway. Adaptogens help the body maintain homeostasis by affecting the central nervous system (CNS). They do this by targeting both biochemical markers of stress and metabolic regulators, including the hormones that regulate the HPA axis activity such as cortisol, nitric oxide, and glucose (Baek et al. 2019).

The research concerning the effects of adaptogens on stress management is still relatively new and there are many research questions that are unanswered. For example, the research that has been done has focused on how adaptogens battle adrenal fatigue, which is when our adrenal glands get overworked by stress and stop producing the hormones we need, but not much research has extended beyond that point. Significant studies on how adaptogens can affect mental performance have been overlooked, meaning they have yet to be conducted. Researchers have just recently started to explore the anti-cancer properties that certain adaptogens have. Furthermore, adaptogens tend to be considered as one group of plants and herbs, but adaptogens come in varying forms and properties. When considered separately, each adaptogen is unique, both in its physical form and its capabilities.

Withania somnifera, commonly known as ashwagandha, is one the most popular herbs used in traditional Indian medicine. Ashwagandha is known for its adaptogenic, antioxidant, and immune-supportive properties

(Lopresti et al. 2019). Recent studies have also shown ashwagandha to be an effective herb in weight management. Panax ginseng, commonly known as Korean ginseng, is traditionally used in Korean and Chinese medicines. Ginseng has demonstrated numerous therapeutic properties (Baek et al. 2019). Among the adaptogenic herbs, ginseng may be one of the most widely used to improve energy and general health. Ashwagandha and ginseng are the most commonly used for adaptogenic purposes, and their extracts are most commonly used.

The purpose of this paper is to compare the effectiveness of ashwagandha and ginseng in their stress-relieving properties. The data sets from two prior studies were analyzed and compared to determine if there was a substantial difference in the stress-relieving properties of ashwagandha and ginseng. The data analyzed consisted of commonly used stress test scores and questionnaires. By comparing data from similar studies with slightly varying testing scales, the effectiveness of the adaptogens can be analyzed to determine which adaptogen is better suited for stress management.

Methods

Data Collection

I began my search by using PubMed to search for articles that would contribute to my research question. The first set of keywords I used were "adaptogenic", "stress", and "depression". I applied the "Most Recent" filter to this particular keyword search. This search resulted in many articles, and after skimming through a few, I found a medical journal article that explained the effects of Korean Red Ginseng in individuals with high stress levels (Baek et al. 2019). I skimmed the article and determined that it was a peer-reviewed original research paper that was recently published. Using the same keywords, I found another medical journal article that detailed the stress-relieving pharmacological actions of an ashwagandha extract (Lopresti et al. 2019). After skimming the article, I determined that it was also a peer-reviewed original research paper that was recently published. The two experiments from the journal entries were quite similar, with one being 42 days long and the other being 60 days long. Both experiments were also randomized, double-blind, and placebo controlled.

Data Analysis

Baek et al.'s (2019) treatment consisted of four capsules taken twice daily of either 2g/day of Korean Red Ginseng (KRG) powder or placebo for 6 weeks. The packaging, storing, and handling conditions were identical for the groups receiving both the KRG and the placebo. The normal control group received neither KRG nor placebo. Lopresti et al. 's (2019) treatment consisted of capsules containing 240 mg of ashwagandha extract or placebo for the participants. They were instructed to take a capsule once daily after dinner with 250 mL of water. The capsules were identical in appearance, shape, color, and packaging. The experiments that Baek et al. (2019) and Lopresti et al. (2019) conducted had similar sample sizes and they met a minimum requirement I decided on. Baek et al. (2019) had a sample size of 63 and Lopresti et al. (2019) had a sample size of 60. For the purpose of my research questions, I evaluated the results of the participants that received the treatment and not the participants that received the placebo. Instead, I focused on the data taken at baseline, or day 1, and the data taken at the end of the experiment in the groups that received the treatment. The two experiments had similarities, but their results were measured on different scales. All of Baek et al.'s (2019) participants underwent the Perceived Stress Scale (PSS) test that was used to measure the degree of individually perceived stress. Lopresti et al. (2019) also conducted a clinician-administered Hamilton Anxiety Rating Scale (HAM-A) test and a self-reported Depression, Anxiety, Stress Scale-21 (DASS-21) test. Both studies also collected blood samples to assess cortisol levels in participants.

Results

In Baek et al. ‘s (2019) study the PSS total score at baseline was 17.52 and 14.00 at 6 weeks which indicates that the PSS test score decreased by the end of the experiment. In Lopresti et al. ‘s (2019) study the HAM-A baseline score was 10.27 and 6.07 on day 60, with a statistically significant 41% reduction in the HAM-A scores, which indicates that the HAM-A test score significantly decreased by the end of the experiment. The DASS-21 baseline score was 16.83 and 11.77 on day 60, with a statistically significant 30% reduction in DASS-21 scores, which indicates that the DASS-21 test score decreased by the end of the experiment. A comparison of Beak et al. ‘s (2019) and Lopresti et al. ‘s (2019) studies that show the decrease in PSS, HAM-A, and DASS-21 scores at baseline and at the end of their experiments can be seen in figure 1. This [figure 1] indicates that the participants in both Baek et al. ‘s (2019) study and Lopresti et al. ‘s (2019) study all showed a decrease in stress, depression, and anxiety after consuming adaptogens in either a powder form or a capsule for a set amount of time.

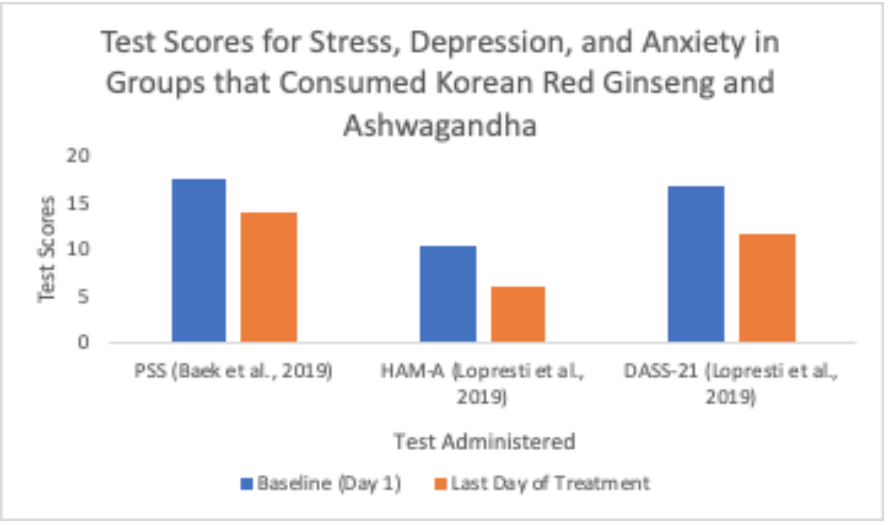

Figure 1: This graph compares the PSS test score that were administered in Baek et al. ‘s (2019) study with the HAM-A and DASS-21 test scores that were administered in Lopresti et al. ‘s (2019) study. The graph shows the test scores at baseline, meaning day 1, and at the end of the two experiments.

Discussion

This study used data collected from two previous studies (Baek et al. 2019 and Lopresti et al. 2019) to compare the efficiency of two well-known adaptogens, ashwagandha and ginseng, to show that both helped to decrease stress at similar rates. Furthermore, the results indicated that both adaptogens had very similar effects on stress levels; however Lopresti et al. ‘s (2019) experimental group that consumed ashwagandha showed slightly higher scores than the ginseng experimental group from Baek et al. ‘s (2019) study. For example, Baek et al. ‘s (2019) study showed a statistically significant 27% reduction in PSS scores at the end of the study. Lopresti et al. ‘s (2019) study showed a statistically significant 41% reduction in HAM-A scores and a statistically significant 30% reduction in DASS-21 scores. These findings are significant because they can provide insight into different forms of medication for stress for patients who either can’t be prescribed pharmaceuticals due to potential complications or who would rather manage their stress using a natural alternative. Furthermore, throughout the research that was conducted for my experimental question, I was unable to find a scientific paper or journal that compared the stress relieving capabilities of ginseng and ashwagandha.

In Baek et al. ‘s (2019) study, the results confirm that consuming ginseng regularly has positive effects on reducing stress levels, as well as depressive symptoms. The study also found a correlation between consuming Korean Red Ginseng and a stabilization within the central nervous system, autonomic nervous system, and hypothalamic-pituitary-adrenal axis. Lopresti et al. ‘s (2019) study had a correlation of a 41% reduction in stress and anxiety in participants consuming ashwagandha versus a 24% reduction in participants consuming a placebo. Overall, both studies showed an overall decrease in PSS, HAM-A, and DASS-21 scores.

Both of these adaptogens are relatively more common than others because of their average low cost and their accessibility (Robinson, 2019). Furthermore, this paper includes a broad range of tests that were conducted to measure the degree of individually perceived stress. For example, Baek et al. ‘s (2019) study measures each participant’s perceived stress using the PSS test, while Lopresti et al. (2019) used both the HAM-A and DASS-21 test. This shows the results of both studies in terms of three different widely used perceived stress scales.

As mentioned earlier, there are not many research studies comparing adaptogens to each other. However, there have been studies conducted on specific adaptogens and their potential benefits. For example, a study was conducted that found that consuming ashwagandha on a regular basis acted as a treatment for depression and anxiety for people with schizophrenia (Gannon, 2019). Another study was conducted that looked at how the adaptogen, rhodiola, affected eating compulsions in obese women. Their results did show a reduction in mean weight and BMI, but the data was not statistically significant (Da Silva et al., 2018). Both the Gannon (2019) and the Da Silva et al. (2018) studies had mild and transient side effects.

One limitation of this study was the very few scientific articles available that compare the efficacies of adaptogens to each other. Another limitation of this study was how relatively new adaptogens are. Most of the data in scientific journals concerning adaptogens is new and there is very little data taken over a long period of time. One limitation from the studies involved in this paper worth noting is that the participants’ perceived stress levels were measured using different tests. Baek et al. ‘s (2019) study used the PSS test and Lopresti et al. ‘s (2019) study used the HAM-A and DASS-21 tests. Due to the limited time scope of both experiments, it is important to note that the results from this paper should not be considered as a lone piece of evidence.

While the results of this paper show the benefits that consuming ashwagandha and ginseng have on stress management, more research can be done on adaptogens themselves. For example, there are very few experiments that have been done on the long-term effects of consuming adaptogens regularly. While the short-term effects are positive, the long-term effects can have vastly different effects on the body. Another question that can be answered is how stress can be affected by the administration of more than one adaptogen at a time. This can also include research on whether adaptogens target specific ailments or if they work as general relievers. Overall, this paper contributes to scientific literature and research because it contributes to existing research concerning more natural alternatives to stress, anxiety, and depression management.

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