Effects of Diet Intervention On SIRT1 Regulation and Depressive Symptoms

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Abstract

The purpose of this research is to investigate the relationship diet has on upregulating Sirt1 levels and consequently reducing depression symptoms. Previous studies have found relationships between poor diet and depression as well as low Sirt1 levels and depression. Resveratrol is a common drug used to upregulate Sirt1 levels and is found commonly in foods like peanuts and grapes. It is hypothesized that diet intervention to increase nutritional density and decrease consumption of processed foods will work similarly to resveratrol to increase Sirt1 blood levels and decrease symptoms of depression. This study will use n=50 participants. There will be a diet intervention group and a diet control group. Diet will be measured using a Dietary Screening Tool (DST) and through skin carotenoid levels. Depression symptoms will be measured through MADRS scale and Sirt1 levels will be measured through RT-PCR method. Data will be analyzed using the independent t-test and correlations will be drawn between variables to assess significance of findings.

Keywords: Diet, Depression, Sirt1, Resveratrol, Beta Carotenoid

Introduction

In the US, **40 million people** are directly affected by **depression** each year (WHO, 2020). This rate is continuing to rise, spurring research to look into its causes and potential ways minimize its effect. Research has found links between **depression** and both **diet quality** and **genetics** (Jacka et al., 2017 & Hurley et al., 2014).

Research has found significant positive results in treating depression by **increasing** consumption of **fruits and vegetables** and **decreasing** consumption of **processed foods and trans fats** (Francic et al., 2019). This research, however, is not conclusive for all individuals.

SIRT1 is a gene that controls longevity and protects cell function, but is **downregulated** in individuals with depression (Zilikens et al., 2009). **Resveratrol** is a common drug used to **upregulate SIRT1**, but is found commonly in foods like **grapes** and **peanuts** (Hurley et al., 2014).

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Key Studies

Hurley et al. (2014) used **resveratrol to alleviate depressive behaviors** and found acute and chronic effects of resveratrol which resulted in less helplessness of rats.

A study done by Kim et al. (2016), **found downregulation of Sirt1 in socially defeated mice** and no change in resilient mice.

Jacka et al. (2017) and Francis et al. (2019) found that **diet intervention significantly decreased depression symptoms**.

The **purpose** of this study is to investigate how **diet intervention** can **upregulate SIRT1** and if this **decreases depression** symptoms. It is **hypothesized** that diet intervention will have a similar influence on SIRT1 silencing as resveratrol, and **decrease depression** symptoms

Wu et al. (2018) researched normal vs high fat diet on depressive behaviors in mice. The study found that **high fat diet mice displayed more helplessness** than normal diet mice in stressful situations.

Zillikens et al. (2009) found a relationship between SIRT1 and obesity. **SIRT1 inhibits glycolysis** and enhances gluconeogenesis, which promotes fat loss.

Sanchez-Villegas et al. (2012) found that **diets high in processed, fried, refined, and sugary foods reflected greater depression symptoms**.

Experimental Design

This study consisted of n=100 participants with 50 males and 50 females aged 18-25. Participants were randomly assigned into diet intervention or diet control group.

Diet intervention group received education from a registered dietician about diet changes for the study. This included increasing consumption of fruits, vegetables, whole grains, healthy fats, and lean meats and decreasing consumption of processed foods and trans fats.

Inclusion criteria: Scored >18 on MADRS, Scored <75 on DST, and had SIRT1 blood levels of <1.0 mmol/L.

Exclusion criteria: Bipolar disorder, using antidepressants or psychotherapy, pregnant, currently participating in a new diet or exercise program or could not adhere to diet intervention.

Methods

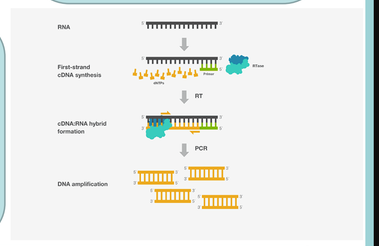
The dietary screening tool (DST) was used to assess diet. The DST assesses intake of fruits, vegetables, whole grains, lean proteins, fats, sugars, sweets, dairy, and processed meats (Jacka et al., 2017). Participants took the DST at the start of the study as well as after 12 weeks upon completion.

The CM-700D Konica-Minolta Spectrophometer was used to measure skin carotenoid content, which reflects accuracy of information in dietary screen (Jahns et al., 2014). The palm of each participant was measured 2 times and the scores were averaged in this study. Palms were read at start and after 12 weeks.

Depression symptoms were assessed using the MADRS screening tool (Francis et al., 2019). The scores range 0-60, with higher scores indicating greater severity of depression. MADRS screen was used at the beginning and after 12 weeks at the end of the study.

To measure SIRT1 levels, 3 mL of blood was drawn from each participant and centrifuged for 5 minutes at 1000 rpm (Song et al., 2011). Blood was drawn at the start and after 12 weeks at the end of the study.

After blood was drawn and centrifuged, the RNA was extracted. With the RNA, the RT-PCR method was used to measure SIRT1 blood levels (Song et al., 2011).



Upon completion of the 12 week study, data was analyzed to determine a relationship between reported and measured diet and reported and measured depression, and if that relationship was statistically significant.