The Effects of Supplemental Plant-Based Enzymes on Digestive Leukocytosis

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Student Research Project

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Abstract

Digestive Leukocytosis, also known as postprandial leukocytosis, is defined as an increase in white blood cell count after consumption of food. Leukocytosis also occurs in diseases such as Celiac Disease and Irritable Bowel Syndrome. The literature has noted that leukocytosis can either occur in healthy individuals after prolonged exercise, after the ingestion of certain strains of bacteria and after consuming processed foods. The literature however, becomes scarce in documenting the incidence and details of leukocytosis after the consumption of processed foods. Many diets and nutritional counsel based on observation dated back to the 1920's suggest that eating processed or cooked foods can cause leukocytosis. The literature also notes that enzymes decrease inflammation, also known as leukocytosis. Thus, it is suggested that processed food ingested with supplemental enzymes will cause significantly less postprandial leukocytosis than in food consumed without enzymes. A double blind study was created in an attempt to prove that enzyme therapy can decrease the amount of postprandial leukocytosis. Blood samples were taken from subjects pre and post consumption of a meal of processed foods. The experimental group was administered Loomis Enzymes and the control group was administered a placebo. The data collected did not reveal statistical significance. Limitations of the study include: timing, food preparation, and enzyme dosage.

Key Words

Leukocytosis, Digestive Leukocytosis, Postprandial, Exercise Leukocytosis, Celiac Leukocytosis, Enzyme, Enzyme Therapy

Introduction

Digestive Leukocytosis is defined as an increase of white blood cells after consumption of food. Leukocytosis normally occurs after consumption of food, exercise, and in inflammatory processes. The induction of leukocytosis from the consumption of foods was originally thought to be a normal occurrence, but it was found that certain foods mainly cooked or processed foods induced leukocytosis in the circulation blood stream of the host. The first to observe this, in 1930, was Paul Kouchakoff, M.D. of the Institude of Clinical Chemistry, Lausanne, Switzerland [1]. He studied the effects of cooked foods and raw foods and how they affected blood chemistry of the body. His conclusion was that if cooked foodstuff was consumed, leukocytosis was induced, and if raw foodstuff was consumed, leukocytosis was not present. Most of the research done on digestive leukocytosis was conducted prior to 1970's and performed in Europe and Russia. The original research was unavailable. There is minimal organized research done since this initial experimentation, but many experts theorize that consuming raw food will decrease leukocytosis and base it on this antiquated research done by Kouchakoff. Proponents of this thought have asserted that it is a lack of enzymes in the food - due to processing, or

cooking - that causes leukocytosis, which eventually lead to destructive pathology[2]. There is, however, a lack of research to prove this theory. The authors have constructed a pilot study to determine if the ingestion of processed foods causes leukocytosis in humans, and if supplementing plant-based enzymes can decrease the leukocytosis induced by the consumption of processed foods devoid of enzymes.

There is evidence today that shows leukocytosis increases after exercise[3], after consumption of certain toxins[4], and in food sensitivities[5]. It is also understood that people with certain food sensitivities such as Celiac Disease, and Irritable Bowel Syndrome present with white blood cells increase when they are exposed to triggering agents. It is well established in the literature that improper inoculation of certain bacteria can cause an infection and thus increase the white blood cell count. Research has been conducted and has determined that under normal circumstances athletes after exercise will have an increase in leukocytosis. Therefore, leukocytosis occurs in many syndromes, pathologies, and is a normal variant. Is it also possible to have a sub-clinical level of leukocytosis after eating cooked, or processed foods in healthly individuals? And, is it possible that supplemental plant-based enzymes can decrease the leukocytosis created with eating cooked and processed foods? These two questions will be investigated in our research.

It is our hypothesis that cooked and processed foods will increase the white blood cell count of the participants, and that enzyme supplementation will stabilize the white blood

cell count. Thus, clarifying the effectiveness of supplemental plant-based enzymes in reducing leukocytosis quantitatively.

Methods

The Institutional Review Board of Logan College of Chiropractic approved the research methodology. The research was performed on twenty healthy human subjects compiled of students of Logan College of Chiropractic, who consented to the study. The twenty subjects were randomly put into two groups of ten. This study is in compliance with the institutional guidelines in performing research on human subjects. These subjects first filled out an exclusion questionnaire to determine if they were free from food allergy, food sensitivities, blood disorders, gastrointestinal disorders, blood-borne disease, or any trauma or illness. Directions were then given to the subjects. Then subjects signed a consent form stating that they were aware of the experiment, the risks associated, and confidentiality involved.

Diane Dykes, the technician at the laboratory within the Montgomery clinic obtained three to five milliliters of blood via venipuncture from these students. The technician performed a complete blood count (CBC) prior to consumption of food. Students were randomized into an experimental group or a control or placebo group. Each group of students consumed a cooked hot dog, on a white bun. One hot dog contains 12 g. of fat, less then 1 g. of carbohydrates, 5 g. of protein, equaling 150 calories. The white bun contains 1.5 g of fat, 22 g. of carbohydrates, 4 g. of protein, equaling 120 calories. The

experimental group was given a two plant-based enzyme supplement with their meal, and the control group was given a two placebo pills. The plant based enzymes utilized contain the following in a proprietary blend equaling 230 mg: alpha-amylase (from aspergillus oryzae), protease (from aspergillus oryzae), glucoamylase (from rhizopus nitveus), lactase (from aspergillus oryzae), maltase (from aspergillus oryzae), cellulose (from aspergillus niger), acid stable protease (from apergillus niger), hemicellulase (from apergillus niger), Invertase (from saccharomyces cervisiae), and lipase (from aspergillus niger and rhizopus oryzae). The placebo pill contained white granulated sugar. The students were informed they could drink water with the consumption of the pill, but it was not specified how much they could drink. Forty-five minutes after consumption of food and pill, the subjects had their blood samples collected via venipuncture once more and Diane Dykes of the Mongumery laboratory performed another complete blood count.

Results

The complete blood count was performed and the leukocytes analyzed by the research department at Logan College of Chiropractic. The results of the data analysis are shown in Table 1 below.

Table 1. Results of pre and post complete blood count values, of Loomis Experimental vs. Placebo

	Experimental group Plant-based Enzyme	Control group Placebo	Exp and Cont Post CBC
Mean	Pre 7.08 post 7.14	Pre 6.54 post 6.21	Part E 7.14 Part C 6.21
Standard Deviation	Pre 1.73 post 2.18	Pre 1.52 post 1.47	Part E 2.18 Part C 1.47
T-Value	.336	.219	1.12
P- degrees of freedom	.744	.056	.28

The ten subjects who belonged to the experimental group had little if any change in the leukocytes before and after the consumption of the hot dog and the Loomis Enzyme. The mean leukocyte count prior to consumption was 7.08 and after consumption was 7.14. There was a standard deviation of pre 1.73 and post 2.18. The p-value and t-value are not within the range of statistical acceptability.

The ten subjects who belonged to the control group also had little if any change in leukocytes before and after the consumption of the hot dog and the sugar pill. The Pre and post mean values had a standard deviation of 1.52 and 1.47 respectively. The p-value and the t-value are not within the range of statistical acceptability.

Comparison of the two groups shows a t-value and p-value of insignificant statistical acceptability.

The statistical analysis demonstrates no significant difference found in the two groups. None of the complete blood count post showed an elevated leukocytosis. There was a decrease from the pre to the post, but this not significantly different from the control group to the placebo group.

Discussion

Digestive leukocytosis could be an important finding for the nutrition. If consuming a meal causes elevation in leukocytes that over time can propagate inflammation - causing adhesions, arterial sclerosis, or postprandial pain; then finding the foods that cause this increase would be imperative. Furthermore, if plant-based enzymes could decrease the leukocyte elevation, then a small dietary change could improve the health of individuals.

The research preformed needs to be improved upon. Some of the improvements to this experiment will be discussed. The experiment could be improved by timing. A study done showed that leukocytosis after a meal was higher at 20 minutes then at 50 minutes[6]. Thus, if the second CBC was taken within 20 minutes the results may lead to a different outcome.

Because of circumstance undetermined, the food was probably cooler than anticipated. A study was done which shows that food cooked at a certain temperature would induce leukocytosis when at the same food at a lower temperature would not[7]. If the food was at

a higher temperature leukocytosis might be induced. The quantity of food may not have been sufficient to induce an immune response. A future study may need to use various amounts of food to ascertain the effects of food quantity on postprandial leukocytosis. The dosage of enzyme supplementation intake may have been inadequate. Greater amounts of food and enzyme supplementation, dependent on the mass of the individual, may have a greater effect on the subject. Future research must be done to have a better understanding.

Conclusion

Postprandial leukocytosis is lacking well documented research. Research has been conducted in Europe and Russia, but it is not accessible to the authors of this study. More research is needed regarding postprandial leukocytosis. The discovery could improve the health of individuals at a low cost to the public. The diet's of the American public consists mostly of processed foods, and cooked foods, which increase incidents of inflammation.

Another research project could be to investigate the effects of enzymes on leukocytosis after exercise[8]. This is more accessible in the literature and may prove to be valuable to the health care and improving public health.

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