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Dietary Assessment of HIV/AIDS Patients in Accordance with the DASH Diet Guidelines

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Dietary Assessment of HIV/AIDS Patients in Accordance with the DASH Diet
Guidelines

by

Whitney Nichole Maxey

A Thesis

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Science,

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ABSTRACT

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Background. According to estimates by the World Health Organization (WHO) and UNAIDS, 33.4 million people were living with Human Immunodeficiency Virus (HIV) at the end of 2008. Currently there is no cure for HIV; however, there have been successful strides in combating this disease. Treatments for HIV consist of using Highly Active Antiretroviral Therapy (HAART), to slow the progression of this disease. One of the major side effects of HAART is the risk of developing cardiovascular disease.

Objective: The objective of this study is to identify dietary habits of HIV positive adults in accordance with DASH diet principles.

Design: This study involved developing a of a food frequency questionnaire that assessed HIV positive adults dietary practices based on the DASH diet. The DASH diet principles include: decreasing dietary sodium and saturated fat intake, increasing magnesium and calcium, increasing potassium, and fiber intakes which may lower risk of developing hypertension and heart related diseases.

Participants/setting: The setting took place at Friends For Life a community-based non-profit organization which provides services to HIV positive adults in Memphis, Tennessee. There were nine-teen participants in this study all whom were HIV positive and receiving services from Friends For Life on the day of the study.

Results: HIV positive adults in Memphis, Tennessee do not have dietary practices that decrease their chances from developing coronary artery disease, myocardial infarctions, or other cardiovascular diseases (CVD).

Conclusions: Even though HIV adults had eating habits which puts them at risk for developing a cardiovascular event or disease, their medications, disease states, weight/height index, social status, and economic status can also contribute to their risk for developing CVD.

TABLE OF CONTENTS

Chapter	Page
Chapter I Introduction	1
Chapter II Review	6
Chapter III Methods	11
Chapter IV Results	13
Chapter V Discussion	17
References	22
Appendix	25

IRB Approval

Friends For Life

CHAPTER I

INTRODUCTION

History

In the late 1970's and early 1980's a new disease surfaced in the United States and Europe that caused immunological dysfunction in men who had sex with men. There was an emergence in opportunistic infections such as *Pneumocystis carinii* pneumonia (PCP), and a number of unusual cancers like Kaposi Sarcoma in this population. In months to come the immunological deficiency was found in several groups including hemophiliacs, blood transfusion recipients, Haitian immigrants, and in sexual partners or children of these groups. The epidemiology suggested the disease was transmitted through blood or sexual intercourse. In 1983, Pasteur National Institute of Health uncovered a virus molecule with a structure similar to the lymphadenopathy-associated retrovirus (LAV) discovered at the Pasteur Institute in an immunocompromised patient. The virus was then named Human Immunodeficiency Virus (HIV). In 1986, another strain of HIV was discovered (HIV-2) on the West coast of Africa. ⁽¹⁾

Both types are transmitted through sexual contact, blood, and from mother to child and can manifest to AIDS and other opportunistic infections if left untreated. It has been discovered HIV-2 is less easily transmitted and the period occurring between initial infection and illness is longer than in case of HIV-1 infection. Worldwide, HIV-1 is the

more predominant strain; therefore, when people refer to HIV without specifying which virus they are referring to HIV-1.⁽²⁾ HIV-2 is condensed in West Africa and rarely found elsewhere. Test done in community based settings such as the Oral quick or Oral sure antibody test, are used to test for HIV-1 antibodies and will not pick up HIV-2 strains. The mortality rate from HIV-2 is two-thirds compared to the mortality rate from HIV-1.⁽³⁾

Both types of HIV causes damage to a person's body by destroying CD4 +T cells that comprise of the immune system. AIDS is the latent stage of HIV. When a person progresses to AIDS, they are given that diagnoses by a doctor. The definitive diagnosis of the disease is they must have a CD4 count less than 200 and an occurrence of an opportunist infection. CD4 cells are also known as T- helper cells which are lymphocytes that are specifically targeted and destroyed by HIV. A healthy person's CD4 count can range from 500-1,000 cells/mm³.⁽⁴⁾

Before 1996 scientists estimated that half of the people living with HIV would develop AIDS within a few years. When highly active antiretroviral combinations of medications were introduced in the late 1990s the rate of HIV infection evolving into AIDS significantly decreased. People are now living longer with HIV before they develop AIDS. Everyone has a unique immune system, for that reason a person can develop AIDS anywhere from 5 to 10 years if they are not receiving treatment for HIV.

(4)

PREVALANCE OF HIV

Worldwide

Since 1981 AIDS has killed more than 25 million people, half as many deaths as in World War II, making it one of the most destructive pandemics in recorded history, and is still on the rise. According to the estimates by the World Health Organization (WHO) and UNAIDS, 33.4 million people were living with HIV at the end of 2008. Out of those, 2.1 million are children under the age of 15. The same year around 2.7 million people became newly infected and 2 million died of AIDS, including 280,000 children. In 2005 the AIDS pandemic claimed an estimated 2.8 million lives, which more than half a million were children. ⁽⁵⁾

HIV/AIDS in America

Over 1.1 million Americans are currently living with HIV, and one in five don't even know they are infected. New infections are rising with an estimated 56,300 Americans becoming infected with HIV each year. It has also been reported that more than 18,000 people with AIDS die in the U.S. every year. Since the epidemic began more than half a million Americans with AIDS have died through 2007. ⁽²⁾

Since 1981 AIDS has killed more than 25 million people, half as many deaths as in World War II, (making it one of the most destructive pandemics in recorded history and it is still on the rise. the World Health Organization (WHO) and Joint United Nations Program on HIV/AIDS (UNAIDS) estimate; 33.4 million people were living with HIV at the end of 2008.⁽⁶⁾) Not only does the HIV virus harm the host but the treatment and

medications also take their toll on the health status of the individual. HIV has been found to result in an increase in the incidence of hypertension, osteoporosis, and cardiovascular disease.⁽⁷⁾

Nutrition Related Diseases Associated with HIV Treatment

Heart disease has become one of the number one killers of Americans. Hypertension, obesity, and a poor diet can all lead to risk factors associated with cardiovascular disease. Since the implementation of highly active antiretroviral therapy (HAART) wasting syndrome of HIV positive individuals has been replaced with overweight and obesity. With addition of HAART there are long term complications such as hypertension, elevated triglyceride levels, visceral fat lipodystrophy which can lead to heart disease.⁽⁸⁾

There have been many recommendations to help people who are suffering from hypertension, and CVD including numerous pharmacology and therapeutic classes of drugs; however, there has only been one diet that has been proven to be effective in lowering hypertension, and that is the DASH diet.

The DASH diet (Dietary Approaches to Stop Hypertension) has been recommended to individuals who need to lower blood pressure, decrease their risk of developing CVD, and other heart related complications because it highlights emphasis on decreasing dietary sodium intake, fat, and cholesterol consumption, while promoting foods rich in calcium, fiber, potassium and magnesium.⁽⁹⁾ The goal of this study is to assess if HIV positive individuals have dietary habits based on the DASH diet of decreasing dietary

sodium and saturated fat intake and increasing magnesium, potassium, and fiber which can prevent hypertension and heart related diseases? ⁽⁹⁾

The DASH diet is based on a 2,000 caloric intake with the following nutritional profile:

- Total fat: 27% of calories
- Saturated fat: 6% of calories
- Protein: 18% of calories
- Carbohydrate: 55% of calories
- Cholesterol: 150mg
- Sodium: 2,300 mg
- Potassium: 4,700 mg
- Calcium: 1,250 mg
- Magnesium: 500 mg
- Fiber: 30 g

The research objectives are: To create a questionnaire to identify nutrition knowledge of HIV positive individuals in order develop an intervention that addresses deficits in nutrition knowledge.

CHAPTER 2

REVIEW OF LITERATURE

Treatment and Medications of HIV/AIDS

Long-term remission of HIV-1 primarily seen in the United States can be attained by combinations of antiretroviral agents. Since the introduction of Highly Active Antiretroviral Therapy (HAART) has reduced HIV-induced morbidity and mortality and the lifespan of HIV/AIDS patients has drastically prolonged, but not without server consequences.⁽¹⁰⁾ Some of the adverse side effects of HAART medications are: lactic acidosis, hepatic steatosis, and hyperlactatemia, hepatotoxicity, hyperglycemia, fat maldistribution, dyslipidemia, increased bleeding episodes among patients with hemophilia, osteonecrosis, osteopenia, and osteoporosis, skin rash, insulin resistance, and lipodystrophy. Dyslipidemia is associated with increased risk of cardiovascular disease. According to an article published by the Canadian Medical Association dyslipidemia to levels correlate with increased risk of cardiovascular disease occurs in 70% of HIV-1 patients who are receiving antiretroviral therapy.⁽¹³⁾

One type of agent used in the HAART and the most effective are HIV protease inhibitors (PIs). The main goal for protease inhibitors is to stop the protein protease, which is used by the virus to copy itself, from helping to assemble a new virus. Although HAART has been shown to be effective in treating HIV, there is health risks associated with the treatment. There has become an increasing concern for health care providers

who treat HIV/AIDS patients due to the treatment options leading to additional health risk, one notably being atherosclerosis. ⁽¹²⁾

HIV and Cardiovascular Disease

Atherosclerosis is a chronic inflammatory disease where macrophages play a part in the initiation and progression of atherosclerotic lesions. Characteristics of atherosclerotic lesions include accumulation of oxidized lipid and free cholesterol in macrophages, and the abundance of inflammatory cytokines TNF- α and IL-6. This specific agent has also been linked with increasing cholesterol and triglycerides, lipotrophy/lipodystrophy, developing or worsening of diabetes, high blood pressure, heart attacks, bone changes, and stroke. ⁽¹⁰⁾

Two prospective studies reported in the Journal of Infectious Disease indicated that HIV infected patients were at an increased risk of cardiovascular disease long term. Traditional risk factors still include: age, family history, smoking, hypertension, diabetes, and high blood lipids. It highlighted that in the period preceding HAART, high blood pressure in infected patients was linked with complications related to HIV such as renal failure and vasculopathy. However, in the post HAART era studies have questioned rather HAART may induce hypertension through accelerating atherogenesis and subsequent hardening of the vessel walls. ⁽⁷⁾

The medications can increase lipids in the blood, which can lead to clogged arteries, resulting in a heart attack or stroke. The virus itself has also been associated with an increased risk of cardiovascular disease. One study showed there was a higher risk of cardiovascular disease risk among those who were not taking on treatment compared to

those who were on treatment. The reason still is unclear of how HIV can increase CVD but it is thought that untreated HIV infection can lead to inflammation, which can cause damage to the cardiovascular system. ⁽¹⁴⁾

Diet and Cardiovascular disease

Diet can influence the development of several chronic diseases most notably heart disease. Risk for CVD increases for men over 45 and women over 44 and African-Americans are more likely to suffer from hypertension than Caucasians, which puts them at an increased risk. Together atherosclerosis and hypertension combine for a life-threatening situation. For every 20 point increase in systolic blood pressure and 10 point increase in diastolic blood pressure the risk of death doubles from CVD. Risk factors for hypertension are aging, genetics, obesity, salt sensitivity, and alcohol. ⁽⁹⁾

The results of the Dietary Approaches to Stop Hypertension (DASH) trial indicated that a diet rich in fruits, vegetables, nuts, and low fat milk products and low in total fat and saturated fat can drastically lower blood pressure. The DASH diet has also been shown to reduce total cholesterol and LDL cholesterol. The DASH diet provides more fiber, potassium, magnesium, calcium, and less red meat sweets and sugar containing beverages. ⁽⁹⁾

The DASH has been recommended in reducing hypertension and cholesterol levels which can reduce CVD and other heart related illness. Over the past decade the DASH diet has emerged as an effective stagey for lowering hypertension. Hypertension is a common and important risk factor for cardiovascular disease and renal, including stroke, coronary heart disease, heart failure, and kidney failure. ⁽¹⁷⁾

Since there are no specific diets designed for HIV positive individuals, this thesis will at look at the practicality of implementing the DASH for HIV patients.

In a study reported by the Journal of the American Heart Association a series of three large controlled feeding studies tested the effects of dietary patterns on blood pressure. The three dietary patterns tested were the control diet, fruits and vegetables, and the DASH diet. Out of the three dietary patterns the DASH diet emphasized fruits, vegetables, low-fat dairy products, whole grains, poultry, fish, nuts, increases in protein, and was reduced in fats, red meat, sweets, and sugar-containing beverages. The DASH diet was also notably rich in potassium, magnesium, calcium, and fiber, reduced in total fat, saturated fat, and cholesterol. ⁽¹⁷⁾

It is noted by the authors that several aspects of the DASH diet, and not just one nutrient played a role in decreasing blood pressure. Among all of the partakers in the study the DASH diet appreciably lowered mean systolic blood pressure by 5.5 mm Hg and mean diastolic blood pressure by 3.0 mm Hg. Systolic refers to when the blood pressure when the heart is contracting which should be no more than 120 mm Hg, and diastolic refers to the time when the heart is in a period of relaxation and dilation. Diastolic blood pressure should be no more than 80 mm Hg. ⁽¹⁵⁾

The second diet put emphasis on just fruits and vegetables, which also notably reduced blood pressure but had only about half of the effect of the DASH diet. In this study the DASH diet significantly lowered blood pressure in all major subgroups such has men, women, African-American, non-African-American, hypertensive individuals, and non-hypertensive individuals. Remarkably the effects of the DASH diet in the

African American participants were appreciably greater reducing systolic and diastolic blood pressure of 6.9 and 3.7 mm Hg than in the Caucasian participants. According to several reports released World Health Organization, HIV/AIDS is the leading cause of death and disease among women between the ages 15-44. With a major of women who are infected being African America. (16)

CHAPTER III

METHODS

Research Design

This study involved developing a food frequency questionnaire that assessed HIV positive adults dietary practices based on the DASH diet. The DASH diet principles include: decreasing dietary sodium and saturated fat intake, increasing magnesium and calcium, increasing potassium, and fiber intakes which may lower risk of developing hypertension and heart related diseases.

Survey Development

The first step in developing a survey is to institute goals. The goals of this research project was to identify what positive HIV adults were eating and if their dietary intake corresponded with the recommendations based on the DASH diet, proven to help reduce hypertension and cardiac events. Once the goals established were outlined, the development process for the questionnaire began. The questions on the survey were broken up in food group choices for the purposes of consistency and statistical measurement. Two registered dieticians (experts) were asked to evaluate the first draft of the questionnaire. Their recommendations were reviewed and utilized to revise the first draft of the questionnaire. The revised questionnaire (draft 2 and 3) were revised and approved by the experts. Draft 3 became the final questionnaire and was submitted to the Institutional Review Board (IRB) for approval. This questionnaire was approved by the IRB.

Subject Recruitment and Testing

Convenience samples of nineteen participants were recruited from Friends for Life, a center for HIV positive people in Memphis, TN. Friends For Life is a non-profit organization that provides services to HIV positive people. HIV positive adults who were receiving services at Friends For Life Corporation were asked to complete the questionnaire. The questionnaire was handed out to subjects when they arrive for their daily services. The questionnaire was given to approximately 19 adults. Verbal consent was given when they completed the questionnaire. Once the participants completed the questionnaire the results were analyzed by Meta Analysis (SPSS version 20) software at University of Memphis.

CHAPTER IV

Results

Participants

Every participant in the study was HIV positive and receiving services at Friends For Life Cooperation (FFL). One of the stipulations for conducting the thesis at FFL was that no demographic information would be collected. This includes: age, sex, weight, height, or name to protect the identity of every participant. Some of the survey participants revealed they were homeless but they were still included in the survey results. Three out of the 19 participants were deemed illiterate; therefore, were not included in the final result analysis.

Fruit and Vegetable Intake

Table 1: Consumption of Fruits and Vegetables

Food	Times Consumed	Number of Participants	Percent of Total
Bakes beans, pinto beans, kidney beans, or lentils- fresh or frozen	2-3times/week	10	62.50%
	4-6 times/week	6	37.50%
Nectarines, cantaloupe, bananas	0 times	3	18.80%
	1-2 times/week	10	62.50%
	3-4 times/week	3	18.80%
Orange or Tomato juice	0 times	3	18.80%
	1-2 times/week	9	56.30%
	3-4 times/week	3	18.80%
	5 + times/week	1	6.30%
Potatoes	1-2 times/week	6	37.50%
	3-4 times/week	4	25%
	5 + times/week	6	37.50%
Raisins or Prunes	0 times	7	43.80%
	1-2 times/week	7	43.80%
	3-4 times/week	2	12.50%
Spinach or Tomatoes	0 times	2	12.50%
	1-2 times/week	7	43.80%
	3-4 times/week	4	25%
	5 + times/week	3	18.80%
Consumption of Fruit/Vegetables	1-2 times/day	8	50%
	3-4 times/day	6	37.50%
	5 + times/day	2	12.50%
Juice	0 times	2	12.50%
	2-3 times/week	9	56.30%
	4-6 times/week	5	31.30%

Table 2: Heart healthy fats proven to lower cardiac events when consumed as a part of a regular life style

Food	Times Consumed	Number of Participants	Percent of Total
Yogurt or Milk	0 times	3	18.80%
	1-2 times/week	6	37.50%
	3-4 times/week	5	31.30%
	5 + times/week	2	12.50%
Fiber rich cereals- raisin bran, shredded wheat	0 times	3	18.80%
	2-3 times/week	9	56.30%
	4-6 times/week	4	25%
Consume heart healthy fats- nuts, chicken, turkey, fish	1-2 times/week	6	37.50%
	3-4 times/week	7	43.80%
	5 + times/week	3	18.80%
Consume low-fat dairy options- skim milk, low fat cheese, low fat yogurt, part of your regular diet	No	10	62.50%
	Yes	6	37.50%
Servings of whole grains daily	1-2 times/day	8	50%
	3-4 times/day	7	43.80%
	5+ times/day	1	6.30%

Table3: Consumption of foods which lead to cardiac events, stroke, heart failure, and hypertension

Foods	1-2 times/week	3-4 times/week	5 + times/week
Fast Food Consumption	81.3 % (13)	12.5% (2)	6.3% (1)
*Fried Food Consumption	43.8% (7)	37.5% (6)	12.5% (2)
Consumption of processed/packaged foods- soups, lunchables, salad dressings, prepackaged noodle and rice dishes, pop tarts	50% (8)	37.5% (6)	12.5 % (2)
Beef or pork steaks, roasts, ribs	56.3% (9)	12.5% (2)	31.3% (5)
*Usage of Margarine, butter, or oil in cooking	25% (4)	12.5% (2)	56.3% (9)
Consumption of Eggs not including egg beaters	50% (8)	18.8% (3)	31.3% (5)
*Consumption of cold cuts, lunch meats, ham (not low fat)	50% (8)	37.5% (6)	6.3% (1)
Consumption of hamburgers, ground beef, meat, burritos, tacos	43.8% (7)	31.3 % (5)	25% (4)
Consumption of hotdogs, Italian sausage, bacon, or breakfast sausage	53.6% (9)	31.3% (5)	12.5% (2)
*Consumption of snack foods- chips, buttered popcorn, crackers	25% (4)	50% (8)	18.8% (3)
*Consumption of sweets, cakes, cookies, pies, or other sweets	50% (8)	37.5% (6)	6.3% (1)

*Had one participant who did not consume any amounts

CHAPTER V

DISCUSSION

This study looked at what the dietary habits were of HIV positive adults. Research has proven that HAART medications specifically protease inhibitors can increase cholesterol, and triglyceride levels in HIV patients. It is also known that when there is too much cholesterol in the blood it causes the arteries to become hardened and narrow. When arteries become narrow blood flow to the heart is either slowed down or blocked. When the heart does not receive blood flow cardiovascular events such as myocardial infarctions can occur. (19)

Triglycerides are also another lipid found in the blood that when elevated can also contribute to the hardening and thickening of artery walls also referred to as atherosclerosis. Atherosclerosis increases the risk of stroke, heart attacks and heart disease. (18) Dietary intake of sweets, fried foods, fatty meats, butter, margarine, whole fat milk, pastries, whip cream, and cheese are all foods which contribute to hypertriglyceridemia and hypercholesterolemia.

Research has long proven the relationship between hypertension and salt intake. The relationship is also evident for cardiac events induced by hypertension. According to the World Health Organization 62% of all strokes and 49% of coronary heart disease events are a correspondence of hypertension (20). The more dietary salt consumed whether from salt added to food in the manufacturing process by industry, caterers or food producers increases the risk of hypertension which then induces stroke, myocardial infarctions, and other heart related illnesses (20). This study uncovered the dietary habits

of HIV positive adults residing in Memphis, Tennessee; and discover if those dietary habits put them at an increased risk of developing hypertension, hypercholesterolemia, and hypertriglyceridemia in the HAART era.

Research also shows that adding salt and consuming a diet high in sodium, and processed foods can increase blood pressure, lead to chronic kidney disease, and cardiac events. The results of this survey showed that 25% of the participants added salt to every meal, whereas 37.5% did not salt their food very often, 31% only added salt to certain foods and 6.3% hardly every added salt to their meals.

Consumption of the recommended amount of 2-3 servings of fruit and vegetables a day to increase fiber, vitamin, and mineral intakes and promote healthy dietary habits was met by a majority of this sample. Table 1 illustrates the breakdown of fruit and vegetable consumption by HIV positive adults in Memphis. Fifty percent of the sample size consumed at least one to two servings of fruits and vegetables per day. Raisins and Prunes known to increase fiber intake and promote heart health as well as colon health was only consumed three to four times a week by 12.5% of the population. Forty-three percent did not consume raisins or prunes at all.

High fiber foods such as baked beans, pinto beans, kidney beans, or lentils, fresh or frozen proven to decrease cholesterol levels were eaten two to three times weekly by at least 60% of the sample size. Table 2 outlines a majority of the DASH diet principles of consuming at least five to six whole grain servings per day, consuming heart healthy protein and fats such as low fat milk, yogurt, chicken, fish, and nuts. Nearly fifty-seven percent of the sample size consumed fiber rich cereals two to three times weekly.

However, only 6% reported they ate five or more servings of whole grains per day. Only 12% ate yogurt or milk at least five times a week. When asked about consumption of heart healthy fats and protein like turkey, fish, nuts, and chicken a report only three out of the 16%, 18%, ate time five or more times a week. Low fat dairy such as skim milk, low cheese and yogurt was not consumed as a regular part of dietary intake by 62% of the population. This data from table 2 reveals that at least 60% of the sample size does not consume heart healthy fats and protein which have been proven to increase heart function and decrease risk for developing hypertension.

Table 3 outlines foods which specifically contribute to hypertension, coronary heart disease, and high cholesterol and triglyceride levels as well increase strokes, heart failure, and heart attacks which can decrease life span and lead to death. Fried food was consumed one to two times a week by 43% of the population, and consumed three to four times as week by 37% and five or more times a week by 12%. Fast food was consumed one to two times a weekly by 81% of the population. The remaining twelve percent, and six percent, ate fast food three to four times weekly, and five or more times a weekly respectively. Consumption of processed or packaged foods including soups, lunchables, salad dressings, prepackaged noodles, rice dishes and pot tarts which all contribute to high sodium intake leading to hypertension was consumed one to times a week by 50% of the population. These results could be skewed meaning some people may have not read the question fully and assumed the question was per day and not per week. Research has shown the average American exceeds around ten grams of salt per day, and the recommended amount of salt consumption by the WHO in around 5 g (one teaspoon) (20)

The use of oil, margarine and butter in cooking was used more than five times a week by 56% of the sample size. The consumption of meats such as hamburgers, ground beef, burritos and tacos were eaten one to two times weekly by 43%, three to four times weekly by 31% and five or more times a week by 25% of the population. This suggests that the sample size or consuming high fat meat products which contribute to high cholesterol levels. Snack foods such as chips, buttered popcorn, and cracker all high in sodium were eaten one to two times a week by 25%, three to four times weekly by 50% and only 18% reported more than five times a week. The reported intake of sweets such as cookies, cakes, pies, or other sweet intake of one to two times per week was recorded by 50% of the group and the remaining 37% reported intake of three to four times weekly and 6% consumed them five or more times a week.

All three tables suggest that the HIV population in Memphis does have some healthy dietary habits, ie the fruit and vegetable consumption. However, their overall dietary intake and habits do increase their changes of cardiovascular illness and comorbidities associated with cardiovascular disease especially those receiving HAART medications.

Limitations

It cannot be assumed every HIV patient is on HAART therapy or are they compliant when on the cocktail medications. This survey was also completed in the summer season when farmers markets and grocery stores typically sell fruit and vegetables at a lower price than during the winter months. It cannot be statistically

proven at this time if the time of season and price influenced HIV patients buying and consumption patterns.

The limitations of this study included not being able to obtain demographic information such as race, height, weight, BMI to correlate dietary intake with demographic information. Another limitation was not having access or knowledge of the CD4 counts of the participants, their lipid panel consisting of triglycerides, LDL, HDL, and total cholesterol levels, or if they were currently receiving HAART therapy and if they were, were they compliant. Had we known the CD4 count of the participants, we could have compared dietary intake overtime to the correlation of CD4 counts and AIDS progression. Having the lipid panel, dietary intake, and knowing if a patient was currently on HAART therapy would have better allowed us to make the correlation of dietary influence on the risk of cardiac events in the HIV population.

Future Studies

Future studies regarding decreasing cardiovascular disease in HIV patients should look at their CD4 counts, economic and social factors, HAART regimen and their lipid panel for better correlation statically analysis. In the future the plan is to assess HIV positive adult's dietary habits and monitor their viral load test, as well as their CD4, AIDS prognosis, weight, height, BMI, economic factors, and lipid panel labs to determine their risk for developing a cardiovascular event.

REFERENCES

1. Ishmael C GL. Human Immunodeficiency Virus (HIV) – A Global Pandemic. <http://www.stanford.edu/group/virus/retro/2005gongishmail/HIV>. Accessed April 5, 2011.
2. HIV in the United States. www.cdc.gov/hiv. Updated 20102010.
3. HIV types, groups and subtypes. <http://www.avert.org/hiv-types.htm>. Accessed April 23, 2011.
4. National Institute of Health. HIV Infection and AIDS: An Overview. US department of Health and Human Services. March 2005.
<<http://www.niaid.nih.gov/factsheets/hivinf.htm>>
5. HIV/AIDS among Youth. . www.cdc.gov/hiv/resources/factsheets/youth.htm. Updated 20082010.
6. HIV & AIDS Statistics From Around the World. <http://www.avert.org/aids-statistics.htm>. Accessed August 10, 2011.
7. Aberg JA. Cardiovascular complications in HIV management: past, present, and future. *J Acquir Immune Defic Syndr*. 2009;50(1):54-64.
8. Anuurad E, Semrad A, Berglund L. Human immunodeficiency virus and highly active antiretroviral therapy-associated metabolic disorders and risk factors for cardiovascular disease. *Metab Syndr Relat Disord*. 2009;7(5):401-410.
9. Whitney E R, S. Diet and Health; Nutrition and Infectious Diseases. In: *Understanding Nutrition*. 12th ed. Belmont, CA: Wadsworth; 2009:605.

10. Chen L, Jarujaron S, Wu X, et al. HIV protease inhibitor lopinavir-induced TNF- α and IL-6 expression is coupled to the unfolded protein response and ERK signaling pathways in macrophages. *Biochem Pharmacol.* 2009;78(1):70-77.
11. Bergersen BM. Cardiovascular risk in patients with HIV Infection: impact of antiretroviral therapy. *Drugs.* 2006;66(15):1971-1987.
12. Crum-Cianflone N, Tejidor R, Medina S, Barahona I, Ganesan A. Obesity among patients with HIV: the latest epidemic. *AIDS Patient Care STDS.* 2008;22(12):925-930.
13. Montessori V, Press N, Harris M, Akagi L, Montaner J. Adverse effects of antiretroviral therapy for HIV infection. *CMAJ.* 2004;170:229.
14. Havlir DV, Currier JS. Complications of HIV disease and antiretroviral therapy. *Top HIV Med.* 2006;14(1):27-35.
15. MedicineNet. Definition of Systolic.
<http://www.medterms.com/script/main/art.asp?articlekey=1616>. Accessed December 9, 2010.
16. World Health Organization. Women's Health.
<http://www.who.int/mediacentre/factsheets/fs334/en/index.html>. Accessed November 21, 2010.
17. Nutrition Care Manual. . <http://www.nutritioncaremanual.org/>. Updated 20092010.
18. Triglycerides: Why do they matter? Mayo Clinic.
<http://www.mayoclinic.com/health/triglycerides/CL00015>
19. Third report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III): Executive summary. National Cholesterol Education Program.

http://www.nhlbi.nih.gov/guidelines/cholesterol/atp_iii.htm. Accessed August 25, 2011.

20. BMJ-British Medical Journal (2009, November 24). High salt intake directly linked to stroke and cardiovascular disease. *ScienceDaily*.

Appendix