TRADITIONAL DIET OF THE SAALISH. KOOTENAI. AND PEND D'OREILLE INDIANS IN NORTH WEST MONTANA AND CONTEMPORARY DIET RECOMMENDATIONS, A COMPARISON

by

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Margit Elisabeth Groessler

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ABSTRACT

Native Americans in Montana have a higher prevalence of diabetes that the national average. Some health authorities believe this may be due to their current dietary practices. However, to understand the impact of current dietary practices it is important to compare traditional diets with current dietary recommendations. Historical review was used to collect data on the Traditional Native American diet. These data were analyzed and calculated as part of a 2000 calorie meal plan. Untied States Department of Agriculture (USDA) and American Diabetes Association (ADA) diet recommendations were analyzed accordingly and compared to the analysis obtained from the Traditional Native American diet. It became apparent using Chi-Square analysis that the Traditional Native American diet was significantly higher in protein and lower in carbohydrate contents that the ADA and USDA diets. USDA and ADA recommendations have apparently not been tested on Native Americans and are considered the standard for healthy diets. It seems therefore crucial that these diets are tested for outcomes on Native American populations.

CHAPTER 1

INTRODUCTION

Indians roamed the Americas for many centuries, Figure 1. The only records available are in the form of rock paintings and ruins. Roaming tribes such as the Saalish, Kootenai, and Pend d'Oreille Indians of Montana did not leave artifacts behind, and the only historical records are in the form of ancient bones and oral tradition (Leustig, 1994).

Figure 1. Nomad Tribe Site

Roaming tribes ate diets which were seasonal and included mostly game meat and fish. However a variety of vegetable matter such as fruits, roots, and herbs were also available although to a much lesser degree (L.A, 2007). Some of these meats and plant products could be preserved by drying and were available year around. Often dried goods

were used to trade against other goods such as meat, clothing, or tools among the tribes native to this area.

The horse arrived in the lives of the Saalish people somewhere in the early 18th century (Arlee, 2005). Trading and hunting far from home became much easier when horses were available. Firearms also reached this area before Lewis and Clark. This made large game hunting much easier. Consequently, across the continental divide for buffalo was no longer difficult.

Problem

Native Americans in Montana have a higher prevalence of diabetes that the national average. Some health authorities believe this may be due to their current dietary practices. However, to understand the impact of current dietary practices it is important to compare traditional diets with current dietary recommendations.

Purpose

The purpose of this study is to identify dietary foods consumed by the people who roamed the Mission and Flathead valleys, the territory of what is now Lake County, Montana prior to 1806. These identified foods and the approximate amounts in which they were consumed will then be compared to the diet recommendations made by the United States Department of Agriculture (USDA) and the American Diabetes Association (ADA) which implies that it is the ideal diet for everyone including Native Americans.

Background and Significance of Study

Prior to the arrival of European settlers American Indians in North Western Montana were hunters and gatherers (Leustig, 1994). They ate native plants and hunted game only for personal use. Native Americans believed that one must live in harmony with the land and take only what one needs. Over time Native Americans became accustomed to a life of trading instead of hunting and gathering. “Professional hunters” would hunt for fur far in excess of what was needed and would trade these for firearms, metal axes and knives, and western clothing (Leustig, 1994). Items formerly unavailable were now obtainable by trade. As a result the game herds were drastically reduced and may even have become extinct (Leustig, 1994).

As more and more white immigrants displaced Indians from the Eastern United States region by region, Native American nations lost access to areas large enough to gather sufficient amounts of what they needed for life. The buffalo herds were greatly reduced in size; strange diseases plagued the Native Americans and eradicated whole communities. Land previously forested was made bare by logging and then plowing for the sake of farming (Leustig, 1994).

Hunting and gathering communities depended largely on meat as their primary food source. Vegetable matter was eaten in much smaller amounts and was considered an adjunct. Tradition was passed on by word of mouth from one generation to the next. These traditions, ancient stories and fables, and eye witness accounts are the only records available today Leustig, 1994).

Research Question

Questions the study will address will include: 1.What nutrients comprised the traditional Native American diet? 2. How does the traditional diet consumed two centuries ago by the roaming tribes of the Flathead Indian Reservation compare to the USDA and ADA diets?

Conceptual/Theoretical Framework

Myra Levine and her conservation theory have been chosen to guide this study. Levine states that “from the moment of birth until the instance of death every individual cherishes and defends his wholeness” (Levine, 1969, p.93), “We know we are whole. Everything in our life experience reinforces our confidence in that certainty” (1996, p.39). Levine sees a unique value in each human being. As such she embraces them the way they are, encouraging each to take charge of their own health care (Levine, 1996, p.40).

Levine also developed a nursing process that will guide this research. This process guides through assessment, trophicognosis, and hypothesis to interventions and evaluation of the data. Trophicognosis is a term not found elsewhere and is understood to literally mean the “growth of knowledge”, or what knowledge is gained by the data collected. All these happen in the light of the knowledge that each individual is a holy being (as in sacred), who is deserving wholeness (Levine, 1996, p.40). In this context it is not appropriate to speak of compliance or non-compliance, for no one is expected to blindly follow orders**.** Every one should be free to choose for themselves what they feel

to be in their own best interest for achieving wholeness. Nursing intervention is based on conservation of the patient's energy, the patient's structural integrity, the patient's personal integrity, and the patient's social integrity (Levine, 1969, p. 96). Only the patient can know where such integrity and wholeness can be found.

With the desire to live in harmony with the self and their surroundings, traditional Native Americans appear especially intoned with wholeness. This fact makes Levine's theory uniquely suitable for any work related to Native American issues.

Definitions

Traditional Native American Diet

The term "tradition" usually implies the handing down of information, beliefs, and customs by word of mouth or by example from one generation to another without written instruction. "Diet" is described as the food and drink which is regularly consumed as in habitual nourishment. For this study traditional diet will focus on foods eaten by the Saalish and Kootenai Indians before direct contact with White Man was made. For ease of reference the date chosen is the summer of 1806 when Lewis and Clark came through this area.

Contemporary Diet Recommendations

"Contemporary" usually refers to something existing, occurring, or originating at the same time. For this study this will mean the recommendations put forth by the United States Department of Agriculture and the American Diabetes Association.

Recommended Diet

Recommended diet is defined as the diet "presented as worthy of acceptance". For this study it will be considered as diets set by the United States Department of Agriculture and the American Diabetes Association. These recommendations will be used as a guide for what is believed to be the standard in healthy nutrition. These guidelines are particularly suitable because they are expressed in percentages of daily allowances in addition to specific caloric content.

Assumptions

It is assumed that the Native Americans living in Montana prior to the arrival of Lewis and Clark did not suffer from diabetes related illnesses at the rate of current Native Americans (Lewis and Clark, 1807; Lambert, 1969). The traditional diet of the Native Americans living in the North West region of the United States is assumed to differ from the diet eaten by the Native Americans today. It is believed that the dietary changes which have taken place will be identifiable.

Limitations

There are no subjects available for interview who have lived in the time frame designated as the time when Native Americans lived relatively free of Western influences. Neither are there any subjects available who could remember these times by other means than hear-say. This study has to rely on historic accounts mostly intended to

report personal accounts rather than scientific research which can not be confirmed by living eye witnesses.

The drastic changes in the ecology of this area may mean that some traditional native plants and animals may be lost to this region and perhaps this country. The Mission Valley appears to have had been forested with ancient forests. These forests had to give way to farmland. One tribal informant (Lefthand, 2007) remembers the area of Elmo treed, and the soil much moister. This seems hard to believe, because in our days the soil around Elmo is neither moist nor fertile, and even grass growth is scarce.

Summary

In order to compare traditional and contemporary diets, the traditional diet must be determined. The population chosen for this research study descended from a hunting and gathering society. Hunting and gathering societies have historically left their heritage by tradition. Therefore historical review is the only means of determining what was traditionally consumed by these societies. The results of this historic review will then be compared to the trusted dietary recommendations of the USDA and ADA.

CHAPTER 2

LITERATURE REVIEW

Introduction

The review of literature will look at historical records of the Native American diet. The data will be gathered from tribal records, historical accounts as well as interviews with tribal elders using reminiscence and literature review.

Traditional Native American Diet

Researching traditional diet was problematic. There was little information found regarding this topic other than accounts by pioneers. Most of the information gathered about traditionally available foods came from Native American elders interviews. See appendix A for result summary of internet search.

Traditional Diet

Numerous stories included food. Meat seemed the indicator for plenty versus famine (Grinnell, 1913). When there was no meat everyone was hungry. In times of famine, berries and roots were all there was to eat (Grinnell, 1913). Meat was the foundation of the traditional diet of the Native population in this area (Grinnell, 1913; Leustig, 1994). One informant (TR, 2007), a cultural leader of the Salish tribe, states that the traditional diet must have consisted of an access of 70% of meat.

Assessment: Introduction of Identified Foods

There are two main groups of foods: plant and animal. The plants used in the diet will be presented first follow by the animals.

Plants Used in the Traditional Native American Diet of the Saalish, Pend O'Reille, and Kootenai Tribes

Bitterroot. As shown in Figure 2, the bitterroot, also known as Lewisia rediviva, is a small, low, pink perennial flower with yellow center (Wikipedia, 2007). The flower stems are leafless, 1-3cm tall, bearing a single flower. They range in color from whitish to deep pink or rose. The plant grows on gravelly to heavy, usually dry soil, in scablands or foothill areas. Native Americans dug up the roots with horn diggers or willow sticks with fire hardened tips and horn handles. They peeled away the outer skin from he rich fantastically branched roots and used them fresh or dried in meat stew. The dried roots could also be grounded into flour for use in baking cakes. The root was also used as a medicine for upset stomach. The bitter flavor was not considered offensive.

Figure 2. Bitterroot.

Camas. There are six species of Camas, also known as Camassia, Quamash, Indian hyacinth, Wild Hyacinth. Latein: Camassia quamash, originally believed to belong to the lily family (Wikipedia, 2007). The species originally found in this region is Quamash, also called Indian Camas, or small Camas (Mc Donald, 2007). It grows in lightly shaded forest areas, as well as open prairies and meadows and alongside streams and rivers, see Figure 3.

In July or early August the bulb of the plant was harvested. It could be pit-roasted or boiled, but also dried and pounded into flour. A baked Camas is said to taste something like baked sweet potato, but sweeter with more crystalline fibers. If dried, this root would not spoil for many years. It is reported that camas bulbs collected by Meriwether Lewis in 1806 (Weydemeyer Johnson, 1969, pp. 73) lay for several years in an eastern museum before one of them was experimentally planted. It grew and blossomed giving the camas the name Camassia rediviva.

Another baked dish, but poor substitute for camas was prepared from the black or gray tree “moss”. This was used in times of food scarcity. This moss would fill up stomachs, but was of low nutritional value (Weydemeyer Johnson, 1969)

Figure 3. Camas.

Gooseberry. There was conflicting information gathered regarding gooseberries. All of my informants reported it among traditional foods eaten by the local tribes. However, according to Wikipedia (2007), this plant is not native to the United States, never mind Montana. This researcher has not been able to find any growing wild in this region, and it is possible that the word "gooseberry" is not used in the language of today's scientific world. However, they were also mentioned in Johnson (1969, pp.74) as being "sweet as plums when fully ripe", and being picked by Native children as a treat, see Figure 4.

Figure 4. Gooseberry.

Huckleberry. There are several different species of Huckleberries found in the North Western United States which may be red, blue, or black, see Figure 5 (Wikipedia, 2007). This researcher was not able to obtain information on exactly which species are growing in this area. However it was pointed out by R.A. (Feb. 30, 2007), that the Huckleberries found in this areas belong to the black varieties. The best forests to look in

are those with roughly 50% tree cover – lodgepole pine or mixed forests of lodgepole, larch, spruce, and subalpine fir (Trailtribes.org, 2007). They grow in 20-50 year old burns, old clear cuts, ski runs, avalanche chutes, and older, open high-elevation forests. The Huckleberry is one of the most abundant plants in Northwestern Montana and is still very much sought after. It can cost as much as $40.00 per gallon of fruit (T.M., April 30, 2007).

Figure 5. Huckleberry.

Serviceberry. Is also known as the Sarvis-berry, shadblow, shadbrush, juneberry, sugarplum, Indian cherry; Latin: Amelanchier arborea, Figure 6. This berry is still a favorite today. At least 40 species of birds feast on this fruit in June through August (R.B. April 12, 2007, Weydemeyer Johnson, 1969). They grow randomly in the forested partially shaded areas in this region. The Native Americans dried them and used them as flavoring for meat or soups. They are a rather dry berry with a hearty flavor. They grow on thin trees the wood of which was a favorite for bow making because of its toughness.

Other berries needing to be listed in this section were foam berries also known as fireberries, or buffalo berries which the Natives gathered in the fall and dried for winter (R.A. March 15, 2007). Beaten to a froth with a little water they were considered a treat and eaten as dessert. Strawberries, Raspberries, chokecherries, elderberries, and many less flavorsome fruits were also eaten when the people were hungry enough.

Figure 6. Serviceberry.

Animals used in the Traditional Native American
Diet of the Saalish, Pend d' Oreille, and Kootenai Tribes

According to resources (Burns, 1997; Weydemeyer Johnson, 1969; Wikipedia, 2007) many species of large animals roamed this area in early times. American Bison (or buffalo) and Antelope were always native to the plains, but once the horse arrive d in this area, was often hunted by tribes more local to the area of the Flathead area. Other more local game mentioned by all informants (2007) and Wikipedia (2007) included elk, moose, white-tailed deer, black-tailed deer (mule-deer), mountain goat, black bear, brown bear (grizzly). Even Caribou apparently roamed these parts of the United States. There

were many fish in the many lakes and rivers. Many of them were migratory and contributed greatly to the survival of the local Native population. The most sought after seems to have been the Salmon.

Salmon. The Salmon, Figure 7, seemed a curiosity encountered by this researcher and shall therefore be included in more detail. There was memory of Salmon having been in Flathead Lake (R.A., 2007; M.L, 2007; T.R., 2007). Salmon was found in all interviews and seemed of great importance to the tribes as it had great value in trading and was easily preserved.

Customary fishing sites were shared by many tribes. Besides Salish, Kootenai, and Pend O'Reille, Yakima, Nez Perce, Spokane, and Coeur d' Alene would meet at these sites in the 1000's to share ceremonies, feasting, trading, and games (Lambert, 2003). Though Salmon was the popular fish harvested, other fish were also caught, dried, and stored for winter.

Figure 7. Salmon.

Trophycognosis

There were several species consistently mentioned by the informants. Listed as early spring produce harvested by native Americans in this area were wild celery, wild potatoes (which apparently were obtained by trade from Spokane and Coeur d' Alene Indians who roamed the bordering territories to the West), wild carrots, water cress, and bitterroot. Late spring and early summer produce listed include Camas root, Service berries, choke cherries, goose berries, boysen berries, wild strawberries, and wild raspberries. In late summer, Native Americans in this region are reported to have harvested foam berries (also know as fire berries) and huckleberries (J.A., personal communication, March 3rd, 2007).

Berries could be dried in the sun and were used for trading, roots were also dried and often traded to insure greater variety of food to larger populations as well as increase season of availability (R.A., March 21, 2007). Certain roots could be dried and beaten into flour for baking (Wikipedia, 2007). A popular way to preserve food for emergencies was making pemmican (or pemmican), which was lean dried meat pounded into cakes using fat and berries (Grinnel, 1913).

There was a large get-together every fall in the Columbia River Basin (Lambert, 2003). Literally thousands would congregate at the Columbia River to fish Salmon, share stories, trade goods, feast, and play games. It was said that people came from as far as Canada to participate. These gatherings lasted for weeks. Salmon was plentiful, and everyone would catch and dry what they needed for the winter.

Meats hunted for food by the Native Americans in the region around the Mission Valley and Flathead Lake region included fish (mostly Whitefish and Salmon), game meat (mostly deer, elk, and moose), birds (such as grouse and pheasant), as well as turtles and a few others (R.A., 2007, R.B., 2007, T.R., 2007). Birds such as ducks, geese, crows, eagles, hawks, and hummingbirds were never used for food because they were considered to be spirit birds (R.A., 2007). Bears were never hunted by Saalish, but were considered to be spirit animals as were wolves and coyotes (R.A., 2007). Kootenai hunted bear and used their meat and hide (M.L., 2007). Other goods used for trading include: bead work, clothing, moccasins, cedar baskets, and parofech (spelling unsure), which were raw hide suitcases manufactured by the local tribes (Arlee, 2007). These were often traded for other goods such as potatoes and other roots or hunting privileges especially for buffalo east of the divide and antelope (R.A., 2007).

The species confirmed to be native to this area are: Service-berry, Huckleberry, bitterroot, camas, wild strawberries, and foam berries (Wikipedia, 2007). One informant mentioned a berry called “Mook” in the Kootenai language (M.L., personal communication, April 8th, 2007), but she was unable to translate this. name into English. She mentioned that it was harvested in late summer/early fall.

Contemporary Diet

Several items were identified which are considered “Native” today but were not known to the traditional Native population. The most popular of these are Indian tacos and fried bread. Bread was not known to the traditional Natives in this area, never mind

fried bread. Also “tacos” is a southern food which uses corn tortillas made from corn which is not native to this region.

There were no studies found that compare the traditional Native American diet with any contemporary diet. This comparison is important as a foundation for future research with any topic related to metabolic diseases among Native American populations.

Metabolic diseases among Native Americans are of interest, because it has been noted that there is a significant number of them afflicted with diabetes for example. The prevalence of diabetes among Native American populations is reported as 15/1% or 2.2 times the national average (American Diabetes Association, 2008). All reports agreed on the fact that it is higher among Native American than among white people. The local tribal health office does not keep records, but the tribal health nurse stated that the majority of tribal patients seen at the clinic suffer from diabetes, and she believes that the prevalence may be close to 50% (C.A., 2007).

Summary

The written findings regarding traditional Native American diet included mostly accounts recorded by eyewitness dating more than one century back. There did not seem to be any recent studied conducted which investigated the diet consumed traditionally by Native Americans. The population in question used to be hunters and gatherers and was not known for settlements and cultivating crops of any kind. Descendents from the

hunting and gathering tribes which are known to have lived in Lake County, Montana were interviewed and were able to identify food items eaten by their ancestors.

According to some accounts the diet which is available commonly today is much different from the foods which were eaten long ago. It is a known fact that individuals living in certain areas for many generations adapt to their environments in order to survive. Thus it stands to reason that the diet consumed by Native American hunters and gatherers for literally hundreds of years and generations may have caused the consumers to evolve into organisms uniquely adapted to thrive on these foods.

CHAPTER 3

METHOD

Introduction

This is a historical comparative study. The study will use historical data to determine the traditional Native American diet and compare these to contemporary data as identified by the United States Department of Agriculture (USDA) and the American Diabetes Association (ADA) recommendations.

Steps of Research

Step 1. Consent was Obtained from the Institutional Review Board

Application for consent was sent in December to the review boards using the preprinted form. Submission of the consent form was accepted, reviewed, and granted in February

Step 2. Historical Review of Traditional Diet

The historical review used books and interviews of tribal elders as well as internet sources. The traditional Native American diet consumed by the people living in this area of Montana was determined by researching historical accounts and consulting with a tribal informant who is studying his culture. Identified foods will be analyzed to their contents in regards to percent protein, carbohydrates, and fats. The summary of the results can be viewed in appendix B.

Since the resulting information regarding meat had to be analyzed as to percentages of protein and fat, these had to be calculated using nutritional data. By knowing how much of the calories came from protein and how much from fat, the percent fat and protein could be calculated. The result states the percent in calories which come from fat, not actual percentage of fat. This was done because fat has 9kcal per gram and protein only 4kcal. Thus for the remainder of the study it was decided to use percent calories from fat rather than percent weight in fat.

Step 3. Contemporary Diet

The USDA and ADA recommendations were used for comparison. The ADA diet recommends carbohydrate counting, so an earlier recommendation was used in its stead which uses exchange groups and can be broken down into percentages of daily intake as to carbohydrates, proteins, and fats. USDA and ADA diets were taken from the latest edition published on line. The summary of United States Department of Agriculture (USDA) and the American Diabetes Association (ADA) diet recommendations can be found in appendix C and appendix D, respectively.

Step 4. Data Analysis

Traditional Native American Diet. Since the exact amounts in the traditional Native American diet are not known, estimates will be expressed as a minimum or maximum percentage of hypothesized diets. For example, it is known that Native Americans traditionally consumed a minimum of 70% of their diet in the form of meat. It is not known exactly what kind of meat was consumed on a certain day, but it is known

what kinds of meat were available. Thus one can calculate the minimum percentages of fat and protein had the same kind of meat been eaten all day. This will be done with all available meats identified and an average and mean will be found assuming the quantities of the different meats were similar. In addition when combining the data for each meat, a high and low percentage can be established, which can be compared to the USDA recommendations. Also it can be assumed that the difference between the total of the minimum of fats and proteins and 100% would be the maximum carbohydrate amount taken which will be 30%.

USDA Diet Recommendations. The USDA recommendation as found on line are: 45-65% of calories should be carbohydrates, and 20-35% of calories should be from fat. Since proteins are not mentioned the following was used for calculation for simplicity: 15-25% of calories should be from protein (this is an estimate). USDA does not mention protein, and what's left after max carbohydrates and max fat is 0%. Max after minimal fats and carbohydrates would be 35%. So one could expand this estimate to read 0-35% should be from protein, however this does not make sense, so it was modified to read 15-25%.

ADA Diet. The American Diabetes Association (ADA) provides dietary guidance to patients with diabetes. The ADA web site provides information about good eating habits for patients with diabetes. For this study the guidelines of the ADA and USDA guidelines were both used because of the high incidence of diabetes among Native American populations.

Guidelines have somewhat shifted from exchange group type meal plans to carbohydrate counting methods. For the purpose of this study a meal plan will be used since it is expected to provide information more easily fit for comparison with other diets. A meal plan was chosen from www.diabetic-lifestyle.com for a 2000cal diet. The reason for the 2000 calories was the fact that the USDA recommendations are based on a 2000 calorie diet.

It is important for this study to have a basic understanding of the exchange group type meal planning method. Carbohydrates are divided into different groups of foods which include bread/starch, fruit, milk, and vegetable groups. One carbohydrate exchange provides 80 calories: 15g carbohydrates, 3g protein, and a trace of fat. Exchanges for protein provide 7g protein and vary in calories depending on fat content from very low-fat, low-fat, medium-fat, or high-fat. One fat exchange provides 45 calories: 5g fat, no protein, and no carbohydrates.

Step 5. Data Comparison

The traditional Native American diet will take an average of the meats eaten with the percentages in fat and protein. Carbohydrates will be assumed to be the 30% which remain after the 70% of meat are considered. The ADA diet will use the sample meal plan given by ADA and analyze these as to contents of carbohydrates, proteins, and fats. The USDA recommendations give range of carbohydrates and fats; these data will need to be adjusted using a medium of the ranges given and assuming the rest to be protein.

The percentages of carbohydrates, proteins, and fats will be compared using 2-way tables. There will be comparisons of any possibility of two diets as well as all three diets in a final table. CHI-Square analysis will be used to test for significance.

Limitations of Data

One limitation of this study is that it is not known how much of the traditional diet consumed may have been in the form of carbohydrates. One could assume it was the remaining 30%. However, it can be assumed that at last a portion of these 30% may have been substances such as fiber.

Summary

Comparing the percentages of fats and proteins in the traditional Native American population with the same using the USDA recommendations seems a valid first look at the difference in the overall diet. A major limitation is that exact amounts can not be obtained for the traditional Native American diet, but it is possible to calculate percentage ranges which would appear to be adequate for this study.

CHAPTER 4

RESULTS

Introduction

The purpose of this study is to identify dietary foods consumed by the people who roamed the Mission and Flathead valleys prior to 1806, the territory of what is now Lake County, Montana. These foods and the approximate amounts in which they were consumed were compared to the diet recommendations made by the United States Department of Agriculture (USDA) and the American Diabetes Association (ADA). These are considered to be the ideal diets for everyone including Native Americans.

Analysis of Identified Native American Foods

The first research question asks: what nutrients comprised the traditional Native American diet? The data obtained for the traditional Native American diet show summaries of edible parts of certain animals. Poultry includes the skin. All data were calculated for 100gm of meat. Cooked meat is not from 100gm raw meat, but was weighed after being cooked. It is assumed that meat was eaten in its cooked form, so the data used were from cooked meat information. The tables of the summary are in appendix D. and were taken from www.nutritiondata.com (03/05/08).

The following nutrition information percentages are based on daily recommended intake for a 2000kcal diet. Contents were calculated per 100mg meat. Cooked meat is 100mg meat after cooking, meaning not cooked from 100mg raw meat.

There was no information for berries and roots found. But the minimum of protein and fat consumed and the maximum of carbohydrates could be calculated. For this study only cooked meat will be considered. The cultural leader of this tribe stated that a minimum of 70 % of the diet consisted of meat. Thus a 70% meat diet with the rest unknown but possibly carbohydrates at least in part will be used for this study.

The following tables present the individual meats identified and their contents of protein and fat content in percentages. This information was then taken and plugged into a diet of 2000 kcal assuming that 30% of the total diet was taken in the form of carbohydrates. As Table 1 shows, had a person eaten antelope on a day and had consumed 70% of his diet as antelope and 30% as carbohydrates, he would have eaten 58.8% protein that day and 11.2% fat. Restated this translates to 1176 kcal in the form of protein and 224 kcal in the form of fat of a 2000kcal total intake.

Table 1 Antelope.

150cal/100g	**% cal carbohydrates**	**% cal protein meat/ total diet**	**% cal fat meat/ total diet**	**Calories of 2000cal diet**
carbohydrates	Max 30%			600 calories
proteins		84% / 58.8%		1176 calories
fats			16% / 11.2%	224 calories
calories	Max 600 calories	Min 1176 calories	Min 224 calories	2000 calories

As Table 2 shows, had an individual eaten bear on a day he would have consumed 37.1% of his diet as meat and 32.9% fat that day. This translates into 742 kcal protein and 658 kcal fat of a 2000 kcal diet plan.

Table 2. Bear.

259cal/100g	**%carbohydrates**	**% cal protein meat/ total diet**	**% cal fat meat/ total diet**	**Calories of 2000cal diet**
carbohydrates	Max 30%			600 calories
proteins		53% / 37.1%		742 calories
fats			47% / 32.9%	658 calories
calories	Max 600 calories	Min 742 calories	Min 658 calories	2000 calories

As Table 3 shows, had a person eaten bison for the day, he would have eaten 30.1% of his diet as protein and 39.9% as fat. This translates into 602 kcal from protein and 798 kcal from fat for a 2000 kcal diet that day.

Table 3. Bison.

238cal/100g	**%carbohydrates**	**% cal protein meat/ total diet**	**% cal fat meat/ total diet**	**Calories of 2000cal diet**
carbohydrates	Max 30%			600 calories
proteins		43% / 30.1%		602 calories
fats			57% / 39.9%	798 calories
calories	Max 600 calories	Min 602 calories	Min 798 calories	2000 calories

As Table 4 shows, had he eaten caribou for the day 53.2% of his diet would have been from protein and 16.8% of his intake from fat. This translates into 1064 kcal from protein and 336 kcal from fat for a 2000 kcal diet plan.

Table 4. Caribou.

167cal/100g	**% cal carbohydrates**	**% cal protein meat/ total diet**	**% cal fat meat/ total diet**	**Calories of 2000cal diet**
carbohydrates	Max 30%			600 calories
proteins		76% / 53.2		1064 calories
fats			24% / 16.8%	336 calories
calories	Max 600 calories	Min 1064 calories	Min 336 calories	2000 calories

Table 5 shows that Deer would have provided 57.4% protein and 12.6% fat. This translates into 1148 kcal from protein and 252 kcal from fat on a 2000 kcal daily meal plan.

Table 5. Deer.

158cal/100g	**% cal carbohydrates**	**% cal protein meat/ total diet**	**% cal fat meat/ total diet**	**Calories of 2000cal diet**
carbohydrates	Max 30%			600 calories
proteins		82% / 57.4%		1148 calories
fats			18% / 12.6%	252 calories
calories	Max 600 calories	Min 1148 calories	Min 252 calories	2000 calories

Table 6 shows that Elk would provide 61.6% protein and 8.4% fat if one ate 30% as carbohydrates. This would mean that 1248 kcal came from protein and 168 kcal came from fat on a 2000 kcal diet plan.

Table 6. Elk.

146cal/100g	**% cal carbohydrates**	**% cal protein meat/ total diet**	**% cal fat meat/ total diet**	**Calories of 2000cal diet**
carbohydrates	Max 30%			600 calories
proteins		88% / 61.6%		1232 calories
fats			12% / 8.4%	168 calories
calories	Max 600 calories	Min 1232 calories	Min 168 calories	2000 calories

Table 7 shows that Moose would provide 69.3% protein and 0.7% fat if eaten all day along with 30% carbohydrates. This would mean that 1386 kcal came from protein and 14 kcal came from fat on a 2000 kcal diet plan.

Table 7. Moose.

134cal/100g	**% cal carbohydrates**	**% cal protein meat/ total diet**	**% cal fat meat/ total diet**	**Calories of 2000cal diet**
carbohydrates	Max 30%			600 calories
proteins		99% / 69.3%		1386 calories
fats			1% / 0.7%	14 calories
calories	Max 600 calories	Min 1302 calories	Min 98 calories	2000 calories

Table 8 shows that Pheasant would bring 39.2% protein and 30.8 % fat if eaten all day as meat. This would translate into 784 kcal from protein and 616 kcal of fat on a 2000 kcal meal plan.

Table 8. Pheasant.

247cal/100g	**%cal carbohydrates**	**% cal protein meat/ total diet**	**% cal fat meat/ total diet**	**Calories of 2000cal diet**
carbohydrates	Max 30%			600 calories
proteins		56% / 39.2%		784 calories
fats			44% / 30.8%	616 calories
calories	Max 600 calories	Min 784 calories	Min 616 calories	2000 calories

Table 9 shows Salmon would provide 51.1% protein and 18.9% fat as part of the 70% meat intake. This means 1022 kcal came from protein and 378 kcal came from fat on a 2000 kcal diet plan.

Table 9. Salmon Pink.

149cal/100g	**% cal carbohydrates**	**% cal protein meat/ total diet**	**%cafat meat/ total diet**	**Calories of 2000cal diet**
carbohydrates	Max 30%			600 calories
proteins		73% / 51.1%		1022 calories
fats			27% / 18.9%	378 calories
calories	Max 600 calories	Min 1022 calories	Min 378 calories	2000 calories

Trout would provide 42% protein and 28% fat on a day as shown in Table 10. This means that 840 kcal came from protein and 560 kcal came from fat on a 2000 kcal diet plan.

Table 10. Trout.

190cal/100g	**%carbohydrates**	**% protein meat/ total diet**	**% fat meat/ total diet**	**Calories of 2000cal diet**
carbohydrates	Max 30%			600 calories
proteins		60% / 42%		840 calories
fats			40% / 28%	560 calories
calories	Max 600 calories	Min 840 calories	Min 560 calories	2000 calories

There are many possible variations of meats consumed in one single day. Following is Table 11 showing the ranges possible. Because bear is at the end of one range and was not consumed by the Saalish people was not included. Thus the maximum total amount in carbohydrates would have been 30%. The range of protein would have been 36-93% or 25.2-65.1% of the total diet. The range for fat 7-64% or 4.9-44.8% of the total intake.

Table 11. Ranges Traditional Native American Diet.

134 - 247 cal/100g	**%carbohydrates**	**Range % protein meat/ total diet**	**Range % fat meat/ total diet**	**Range Calories of 2000cal diet**
carbohydrates	Max 30%			600 calories
Proteins		36 – 93% / 25.2 – 65.1%		504 – 1302 calories
fats			7 – 64% / 4.9 – 44.8%	98 – 896 calories
calories	Max 600 calories	Min 504 - 1302 calories	Min 98 – 896 calories	2000 calories

Analysis of Data for Traditional Native American Diet

Following, in Table 12, are the calculations of plotting the data of Native American diet. The data were sorted by percentages of protein in meat from smallest to largest (keeping in mind that fats are just the opposite and can easily be calculated by subtracting the percentage protein from 100%). Moose was found to be highest in protein percentage which indicates that it is the leanest of the meats and lowest in fat. Bison was found to be the lowest in protein and highest in fat content. Salmon and Caribou take up the center with protein contents in the 70th percentile.

Table 12. Percent Protein Lowest to Highest.

Animal	Percent protein
Bison	43% protein
Bear	53% protein
Pheasant	56% protein
Trout	60% protein
Salmon	73% protein
Caribou	76% protein
Deer	82% protein
Antelope	84% protein
Elk	88% protein
Moose	99% protein

The information from the above was then taken and grouped in percentiles of decades from lowest in protein to highest in protein in Table 13. This was done to more easily picture a mean and average. There are 2 kinds of meat which could be considered

to be outliers which are bison at 43% protein and moose at 99% protein. The center lies in the 70th percentile.

Table 13. Percent protein Lowest to Highest in Decades.

Animal	**Percent protein**
Bison	43%
Bear, Pheasant	53%, 56%
Trout	60%
Salmon, Caribou	73%, 76%
Deer, Antelope, Elk	82%, 84%, 88%
Moose	99%

The average of the above data is 71.4% and the mean is 74.5%. Using a daily diet with 30% carbohydrates the result shows that the average of the percent protein from the total daily intake is 49.98% or 50% with the mean 52.15%.

The Saalish did not eat bear, thus leaving out bear, the average for Saalish people is 73.4%, and the mean for Saalish people is 76%. On a total meal plan with 30% carbohydrates this would mean a daily intake of an average 51.38% and a mean of 53.2%.

Analysis of the Comparison

So how does the traditional diet consumed two centuries ago by the roaming tribes of the Flathead Indian Reservation compare to the USDA and ADA diets? The ADA meal plan for 2000cal diet, the USDA recommendations, and the Native American diet are first summarized. Presented below are the individual diet summaries

followed by the combination of all three diets. The data then were analyzed in two-way tables comparing two of the categories at a time.

In Table 14, the exchanges of the ADA diet are broken down and calculated as part of a 2000 kcal diet. Protein and carbohydrates are 4 kcal per gram, while fat is 9 kcal per gram. Ten exchanges of carbohydrates once translated into actual foods are known to include roughly 3gm per exchange in the form of protein and a trace of fat. Thus 19 carbohydrate exchanges include 245g carbohydrates, 57g protein and traces of fat for a total of 1208 calories. The protein exchanges include 476 calories. However the total amount of protein includes also the protein which is consumed as part of the carbohydrates which is actually 704 calories while the actual carbohydrate content is only 980 calories. The fat was translated into percent in calories and not the percent in gram intake.

Table 14. ADA 2000 Calorie Diet.

	Carbohydrates	**Proteins**	**Fats**	**Total**
Carbohydrates	19 exchanges 19x15g= 245g	19x3g= 57g	19x trace	245gx4 + 57x4=1208 calories
Proteins	-	7 exchanges: 7x17g= 119g	unknown	176gx4= 476 calories
Fats	-	-	6 exchanges: 6x5g=30g	30gx9=270+ calories
Calories	980 calories	704calories	270+ calories	1954+ calories
Percent	<50.2%	<36%	>13.8%	100%

USDA Recommendations

The USDA recommendations come in percent of daily intake. These are ranges and, in Table 15, show that the content of carbohydrates should be 45%-65% or 900kcal-1300kcal on a 2000 kcal meal plan. Fats are listed as 20-35% which represents 400 kcal –

700 kcal on a 2000 kcal diet plan. If one would add the highest possible carbohydrates and fats there would be no room for protein. This is not logical and was therefore ignored. Adding the lowest of fat and carbohydrates allows 35% protein. A medium of 15-25% was used here which represents 300kcal – 500 kcal as coming from protein.

Table 15. USDA Recommended Diet.

	Carbohydrates	**Proteins**	**Fats**	**Calories**
Carbohydrates	45-65%			
Protein		15-25%=		
Fat			20-35%=	
Calories of 2000cal diet	900-1300	300-500	400-700	2000

Traditional Native American Diet

It is know that no more than 30% of the Native American diet came from carbohydrates. This would mean less than 600 kcal on a 2000 kcal daily diet. As a result, shown in Table 16, roughly 1000 kcal or half of the diet was from protein and roughly 20% came from fat.

Table 16. Traditional Native American Diet Summary.

	Carbohydrates	**Protein**	**Fat**	**Calories total**
Carbohydrates	< 30%			
Protein		Roughly 50%		
Fat			Roughly 20%	
Calories of 2000cal diet	<600 calories	1000 calories	400 calories	2000 calories

Contrasting Diet Data. Just glancing at Table 17 which lists all three diets, one can see that all three diets are fairly close in fat content but differ in protein and

carbohydrate contents. Highest in carbohydrates is the USDA diet and highest in protein is the Native American diet.

Table 17. Contrasting the Diets.

	Percent calories from carbohydrates	**Percent calories from protein**	**Percent calories from fat**
ADA diet	<50.2	<36	>13.8
USDA recommendations	45-65	15-25	20-35
Traditional Native American diet	<30	50	20

Contrasting ADA and USDA Diet Data. Comparing the USDA and ADA diets in Table 18, it is apparent that they differ somewhat in fat content (ADA is lower) and protein (USDA is lower). Carbohydrate wise they seem roughly close.

Table 18. Contrasting ADA and USDA Diets.

	Percent calories from carbohydrates	**Percent calories from protein**	**Percent calories from fat**
ADA diet	<50.2	<36	>13.8
USDA recommendations	45-65	15-25	20-35

Contrasting ADA and Traditional Native American Diet Data. Table 19 shows in this comparison the ADA diet is obviously higher in carbohydrate content than the Native American diet. ADA is also lower in protein as well as lower in fat content than the Native American diet.

Table 19. Contrasting ADA and Traditional Native American Diets.

	Percent calories from carbohydrates	**Percent calories from protein**	**Percent calories from fat**
ADA diet	<50.2	<36	>13.8
Traditional Native American diet	<30	50	20

Contrasting USDA and Traditional Native American Diet Data: USDA recommends a diet which is much higher in carbohydrates than the Native American diet (Table 20). Also it seems lower in protein and higher in fat content than the Native American diet.

Table 20. Contrasting USDA and Traditional Native American Diets

	Percent calories from carbohydrates	**Percent calories from protein**	**Percent calories from fat**
USDA recommendations	45-65	15-25	20-35
Traditional Native American diet	<30	50	20

Contrasting all Three Diets. Finally, all three diets were put in Table 21, and the averages of the diets were calculated. Thus it was calculated that the average values for the percent carbohydrates, protein, and fat are 45%, 35.3%, and 20.4% respectively. For ease of calculating the average, the average of the protein ranges was used.

Table 21. Contrasting All Three Diets.

	Percent calories from carbohydrates	**Percent calories from protein**	**Percent calories from fat**
ADA diet	<50.2	<36	>13.8
USDA recommendations	45-65	15-25	20-35
Traditional Native American diet	<30	50	20
Average %	45	35.3	20.4

Evaluation of Data

Table 22 presents the facts as found in the study. The USDA data were simplified by using the mean of the ranges for carbohydrates and fat and the difference from the sum of the former and 100% for protein. The average was then calculated as follow: the average carbohydrate consumption of all three diets combined is 45%. The average of protein for all three diets is 35.3%. The average of fat is 19.6%.

Table 22. Contrasting All Three Diets Calculating Averages.

	Percent calories from carbohydrates	**Percent calories from protein**	**Percent calories from fat**
ADA diet	<50.2	<36	>13.8
USDA recommendations	45-65	15-25	20-35
Traditional Native American diet	<30	50	20
Average %	45	35.3	19.6

In Table 23, the USDA recommendations were used as the “expected” counts. Also USDA recommendations were adjusted to a mean value of the recommended range as explained above. Using the USDA recommendation as “expected count” gives a value of 45 for the traditional Native American diet. This number is by far the highest and demonstrates how different the protein intake of the Native American diet is from the USDA diet.

Table 23. Chi-Square Calculation using USDA as Expected Count.

	Percent calories from carbohydrates	**Percent calories from protein**	**Percent calories from fat**
ADA diet	<50.2	<36	>13.8
	.45	**12.8**	**5.02**
USDA recommendations	45-65 use 55	15-25 use 20	20-35 use 25
Traditional Native American diet	<30	50	20
	11.36	**45**	**1.25**

Table 24 uses the ADA recommendation as the “expected” count. When using the ADA recommendations it becomes apparent that it seems to be closer to both the USDA and the Native American diets. The numbers calculated are much lower with the range from 0.46 (USDA for carbohydrates) and 9.09 (USDA for fat). The highest value for the Native American diet is 8.13 for carbohydrates. When looking at the values one can identify that the ADA recommendation for carbohydrates is lower than the USDA recommendation and higher than the Native American diet results.

Table 24. Chi-Square Calculation using ADA as Expected Count.

	Percent calories from carbohydrates	**Percent calories from protein**	**Percent calories from fat**
ADA diet	<50.2	<36	>13.8
USDA recommendations	45-65	15-25	20-35
	0.46	**3.36**	**9.09**
Traditional Native American diet	<30	50	20
	8.13	**5.44**	**2.79**

Clearly the USDA recommendations for protein intake are much further from the traditional Native American diet than is the ADA recommended diet. However, both diets are much higher in carbohydrates than was the traditional Native American diet.

Table 25 presents the Chi-square analysis. This is presented in two steps for convenience. The first table pictures the actual and the expected counts which are the same for all entries. The table is a summary of earlier presented values.

Table 25. Calculation of Chi-Square Step 1.

	Percent calories from carbohydrates	**Percent calories from protein**	**Percent calories from fat**	**total**
ADA diet	<50.2	<36	>13.8	100
	Expected count:	Expected count:	Expected count:	
	45.1	35.3	19.6	
USDA recommendations	45-65 use 55	15-25 use 20	20-35 use 25	100
	Expected count:	Expected count:	Expected count:	
	45.1	35.3	19.6	
Traditional Native American diet	<30	50	20	100
	Expected count:	Expected count:	Expected count:	
	45.1	35.3	19.6	
Total	135.2	106	58.8	100

The Chi-square values are for each entry and each category (Table 26). The value for the ADA diet for carbohydrates is 0.58, for protein is 0.014, and for fat is 1.72. All values in this category are relatively low which places them close to the expected counts. The USDA recommendations show the value for carbohydrates to be 2.17, for protein 6.63 and for fat 1.49. This shows that there is a larger difference in the protein recommendations and the expected count but not the direction of the difference. The Native American diet has two values which appear higher than average. These are the value for carbohydrates (5.06) and the value for protein (6.12). The value for fat is very close to zero at 0.01. Thus it can be concluded that the carbohydrates and protein in the Native American diet differ above average from the other diets (Table 26).

Table 26. Chi-Square Calculation Step 2.

	Percent calories from carbohydrates	Percent calories from protein	Percent calories from fat	total
ADA diet	<50.2	<36	>13.8	100
	45.1	35.3	19.6	
	0.58	0.014	1.72	
USDA recommendations	45-65 use 55	15-25 use 20	20-35 use 25	100
	45.1	35.3	19.6	
	2.17	6.63	1.49	
Traditional Native American diet	<30	50	20	100
	45.1	35.3	19.6	
	5.06	6.12	0.01	
Total	135.2	106	58.8	300

Following is the calculation of the Chi-square value:

Chi-Sq = 0.58 + 0.014 + 1.72 +

2.17 + 6.63 + 1.49 +

5.06 + 6.12 + 0.001 = **23.785**

Summary

The available data were compared using Chi-square test for significance. The value of 23.785 indicates that the difference of the diets is obviously large. Looking at the data, we find that the largest contributions to this number of 23.785 come from the data on protein (USDA and traditional Native American diet) and carbohydrates (traditional Native American diet). While the USDA recommendation for protein is significantly less

than the ADA recommendation, the traditional Native American diet is significantly above the ADA recommendation and even more so above the USDA recommendation. Also we can say that the traditional Native American diet contains much less carbohydrates than the two contemporary diet recommendations. The conclusion would therefore be that the traditional Native American diet is A. significantly higher in protein and B. significantly lower in carbohydrates than the other two diets.

CHAPTER 5

DISCUSSION

Introduction

There have been very few studies done among Native American people. Thus it is important to view any results gained in this study in the light of Native American history and the changes which have taken place over the last centuries. Going back to the way of life before these changes occurred is not possible, however adaptations may be feasible and even welcome as there is a trend to return to certain more traditional activities, beliefs, and values.

Limitations of Results

The results are limited by the fact the USDA recommendations are originally ranges rather than specific percentages. The adjustments made were necessary and make sense but are not originally designed to be there. Thus one could argue that these ranges obscure, or may even compound, the results to some extend. However it is felt that the baseline information gained is accurate enough to provide a working presentation of the differences between the contemporary diets recommended and the traditional Native American diet used by the tribes of the Saalish, Kootenai, and Pend O'Reille Indians before the influences of white culture.

It was intended originally to include contemporary dietary habits of Native American people. However this required permission from the tribal chair to interview

tribal individual. Such permission to interview tribal members about their current dietary habits could not be obtained. Such knowledge could provide further insight into the changes which have occurred over the last centuries.

Implications for Nursing

The implications for nursing are of a wide range. Most important seems to be the fact that the practitioner must keep in mind that ADA recommendations as well as USDA recommendations were designed by non-Indians. There was no information found regarding studies done testing these recommendations on Native Americans for outcomes over long periods of time. By keeping this fact in mind one could perhaps recommend diabetic diets which count carbohydrates and view proteins and fats as simply carbohydrate free. These might prove more beneficial to Native Americans.

One must keep in mind that there has been little research done which investigates aspects of Native American nutrition. Thus the practitioner must keep abreast with new information as it becomes available and keep an open mind.

One must be sensitive to the issue of diet and Native Americans. American Indians might respond differently to the recommendations of USDA and ADA that Americans takes for granted. Also there is a trend among many nations to return to traditional ways of living. This should be encouraged, including eating habits that might be of benefit.

The other importance is to look upon every individual as the individual they are. Myra Levine views each individual as sacred and holy and in charge of his/her own

health care. Regardless of recommendations which may hold true for the majority of Americans, there will always be individuals who will respond differently even among majority populations.

Implications for Education

Though it seems logical to educate patients about going back to their traditional diet in a strict sense, this does not appear to be possible or even desirable. However, given the significance of the problems of diabetes among Native Americans, students need to be made aware of this problem and the possibility of involvement of diet and life style changes. Especially students who will be practicing nursing among Native Americans need to be educated about the problem and possible ways to address this problem need to be included in their patient care.

There is a trend to go back to a more traditional life style on this reservation. This is called Traditional Living Challenge (TLC). This program is run by one of the cultural leaders on this reservation, Tim Ryan (Sandoval & Dupuis, 2006). This project encourages the traditional way of life, but one needs to keep in mind that a true return to this way of life is no longer possible.

Implications for Society

Research studying topics of dietary changes should improve the understanding of traditional diet. It is hoped that such knowledge will help in assisting Native Americans to achieve a healthier life style and better dietary habits which will hopefully lead to a

reduction in diet related diseases such as diabetes or at least greatly reduce the devastating consequences of such diseases. Understanding what a group of people ate for centuries while staying healthy, will perhaps positively influence diet education for the same group of individuals who struggles with diabetes and other life style influenced health conditions.

Implications for General Health

Though meat is presently available at the local stores, it is expensive and presents usually only a small portion of the every-day diet. In addition is comes from animals other than game. Easy snack type foods are high in fat content and carbohydrates. Today, food is available at all times, and what a person eats depends on what one can afford and is willing to pay for and prepare.

According to the Tribal Public Health office (J.K. personal communication, April 15th, 2007) nearly half of all clients seen by the clinic are known sufferers of diabetes. The national prevalence of diabetes is 18.2 million, which is 6.3% of the population (Department of Health and Human Services, Centers for Disease Control and Prevention, 2002). Native Americans are 2.3 times as likely to have diabetes as non-Hispanic whites of similar age (Department of Health and Human Services, Centers for Disease Control and Prevention, 2002).

There are many factors contributing to the incidence of diabetes such as race, age, culture, diet, and life style. In the Mission Valley diabetes is among the leading morbidities. Before white people came to the Americas diabetes did not seem to exist. At

least there is no record mentioning any of the debilitating complications seen in patients who suffer from diabetes such as non-healing lower extremity ulcers, loss of limb, and shortened life span.

Future Research Recommendations

It seems prudent at this time to encourage research studying the impact of diets with higher protein and lower carbohydrate content on Native American populations who descend from hunting/gathering tribes of this region of the United States. Such research could proof valuable for the treatment and prevention of diabetes, and perhaps even obesity. The foremost recommendation would therefore be to study dietary impacts. Using the USDA and ADA diets for comparison, traditional Native American diet patterns should be studied in regard to their effects on blood sugar control as well as weight management and overall health.

Other topics for further study could be the differences between wild meat and domesticated meat along with dietary impacts on human subjects. For example one could compare bison meat to beef as to fat/protein content, but also vitamin and other nutrients.

There needs to be more research studying possible ways which would help the Native population incorporate the old with the new way of life. The goal would be to achieve a way of life which would promote more physical as well as mental and spiritual health. Would it be possible to return to the traditional diet and lifestyle? Would it be desirable? What is it that predisposes Native Americans to diseases such as diabetes? Is it a gene or a metabolic predisposition? What about the tendency to obesity? In what way

are diabetes and obesity related in the Native American population? What is the impact of level of activity? Also how Native Americans might adapt to these changes should be investigated.

Native Americans must be included in more studies. This has been shown to be difficult. This study was to include member interviews regarding their current dietary habits. In order to interview Native Americans, permission must be granted from tribal authorities. To obtain this permission was extremely difficult and had to be abandoned.

Conclusions

There was no evidence found regarding a similar study, either with or without Levine's framework. However it seems reasonable to conclude that the topic is well suited for the use of Levine's concepts of wholeness and individual uniqueness and sacredness. No studies were found which addressed traditional Native American diets and/or which compared such findings to contemporary well accepted dietary recommendations.

Since hunting and gathering societies lived a very active life style, other topics of interest might be the impact of exercise in addition to a more traditional diet. Many stories and eyewitness accounts report that elderly were cared for by their families or even the entire clan, since successful hunting depended on physical endurance and agility. However, once the hunt was no longer successful because of aging, family or other tribal members were expected to hunt for the elderly while aging family members

were also expected to help in whatever way they could by watching young children, completing household chores, or gathering wood and berries (Grinnel, 1913).

Since nutrition and culture are closely related, it seems important to at least comment on the impact Native American spirituality might have on nutrition. Charles Eastman reports in his book “The Soul of the Indian” (1911) that there are three things which make understanding Indian believes very difficult. First, the Native American does not specify deep rooted believes as long as he believes them, when he no longer does so tends to speak of them inaccurately. Second, even if he speaks about these issues, the prejudice of the one who listens stands in the way of “sympathetic comprehension”. Third, studies about the beliefs were made during the transition period when Native beliefs had already begun to disintegrate. Thus it can be assumed that there is a wide array of beliefs among the Native American population which we will not be able to investigate for this particular study.

Levine’s concept of wholeness and the defense of wholeness appears a natural fit for any study involving Native American populations since it embraces the entire individual and views the person as part of his/her environment. The environment with its changes has an impact on the wholeness of the individual who lives in it forcing him to adapt constantly in order to maintain his wholeness. Native Americans have experienced tremendous changes in the last couple of centuries and their wholeness and sacredness needs to be valued in any attempt to learn more about their many health issues.

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APPENDICES

APPENDIX A

INTERNET SEARCH RESULTS

APPENDIX A

INTERNET SEARCH RESULTS

Table 27. Internet Search Results Native American Diet.

	Total hits	**Topics included**	**Items included**	**Focus of topics included**
Google Scholar	135,000	Obesity, all Native American cultures were included	Books, articles from journals, articles from other sources, websites	Obesity and its prevention was the main topic
CINAHL	No matches			
Scirus	225,496 total | 5,577 journal results | 15,828 preferred web results | 204,091 other web results	Instructional materials, letters, Notes from American Heart Association, all Native American cultures were included, body image perception in relation to obesity, a study on buffalo meat effects on diabetes (not available on line), cancer, etc.	Books, web sites, letters, articles from journals, articles from other sources,	Great variety of topics with not particular concentration identified.

Overall the results were too numerous to study in detail and yielded too many topics to sort out. Thus the search was specified to “Contemporary Native American Diet”. See results below:

Table 28. Internet Search Results Contemporary Native American Diet.

Search engine	**Total hits**	**Topics included**	**Items included**	**Focus of results found**
Google Scholar	47,300	General Health topics, diabetes, analysis of ancient fecal samples (see comment below), land uses, ecology in general including all Native cultures.	Books, articles (mostly) from journals and other sources	Health related as to diabetes and general health
CINAHL	No matches			
Scirus	41,910 total | 691 journal results | 1,254 preferred web results | 39,965 other web results	Lists of available books, , a study on buffalo meat effects on diabetes (not available on line- same as previous), educational courses	Books, lists of books, advertisements for courses, journal and other articles. Many of the hits tried were not accessible.	Difference of diet from traditional and contemporary seemed common, but none of these sites seemed available or listed phone numbers to call for information.
Cochran Library	Seemed unavailable to me…….?			

Research on diabetes among Native American populations

Also conducted was an online search pertaining to research done regarding diabetes among Native American groups. The results are as follows:

Table 29. Internet Search Results for Diabetes Among Native Americans.

Search engine	Total hits	Topics included	Items included	Focus of findings
Google Scholar	25,500	Causes of diabetes in all races, prevalence among Native Americans, genetic backgrounds, other curious facts associated with diabetes such as presence of skin lesions and risk of diabetes (Stuart, 1994), studies on exercise and diabetes, included other minorities at high risk for diabetes	Mostly journal articles, some sites, no books among the first 20 items listed	Prevalence and control of diabetes among Native populations
Scirus	239,790 total | 5,938 journal results | 22,691 preferred web results | 211,161 other web results	Prevalence of diabetes among Native Americans, diabetes prevention, patient education sites, study recruiting site!!!!	Web sites (ADA), see listing to left.	Variety but mostly prevalence and prevention

APPENDIX B

TRADITIONAL NATIVE DIET BREAKDOWN

APPENDIX B

TRADITIONAL NATIVE DIET BREAKDOWN

Table 30. Summary of Identified Meats with Content Including Raw Versions.

Food substance	Kcal per 100gm	Kcal from fat	% carbohydrate	% protein	% fat
Antelope raw	114	18	0	84	16
Antelope cooked	150	24	0	84	16
Bear raw	161	75	0	53	47
Bear cooked	259	121	0	53	47
Bison raw	223	144	0	36	64
Bison cooked	238	136	0	43	57
Caribou raw	127	30	0	76	24
Caribou cooked	167	40	0	76	24
Deer raw	120	22	0	82	18
Deer cooked	158	29	0	82	18
Elk raw	111	13	0	88	12
Elk cooked	146	17	0	88	12
Moose raw	102	1	0	99	1
Moose cooked	134	1	0	99	1
Pheasant raw	181	84	0	54	46
Pheasant cooked	247	109	4	56	44

In addition, there is a summary of common nutrients found in the above meats.

Table 31. Summary of Common Nutrients Found in the above Meats.

Per 100gm	**Total fat g & %**	**Saturated fat g & %**	**Cholesterol g & %**	**Sodium g & %**	**Total Carb**	**Protein**	**Vit A/ Vit C**	**Calcium/ Iron**
Trout raw	7g 10%	1gm 6%	58mg 19%	52mg 2%`	0	21gm	1%/1%	4%/8%
Trout cooked	8gm 13%	1gm 7%	74mg 25%	67mg 3%	0	27gm	1%/1%	6%/11%
Whitefish Raw	6g 9%	1g 5%	60mg 20%	51mg 2%	0	19g	2%/0%	3%/2%
Whitefish cooked	8g 12%	1g 6%	77mg 26%	65mg 4%	0	24g	3%/0%	3%/3%
Pink Salmon raw	5gm 8%	1gm 4%	83mg 28%	107mg 4%	0	32gm	4%/0	2%/7%
Pink Salmon cooked	4gm 13%	1gm 6%	71mg 24%	56mg 2%	0	25gm	1%/0%	1%/6%
Deer raw	2gm 4%	1gm 5%	85mg 25%	51mg 2%	0	23gm	0%/0%	1%/19%
Deer cooked	3gm 5%	1g 6%	112mg 37%	54mg 2%	0	30gm	0%/0%	1%25%
Elk raw	1gm 2%	1gm 3%	55mg 18%	58mg 2%	0	23gm	0%/0%	0%/15%
Elk cooked	2gm 3%	1gm 4%	73mg 24%	61mg 3%	0	30gm	0%/0%	1%/30%
Bear raw	8gm 13%	0gm 0%	0mg 0%	0mg	0	20gm	0%/0%	0%/37%
Bear cooked	13gm 21%	4gm 18%	98mg 33%	71mg 3%	0	32gm	0%/0%	1%/60%
Moose raw	1gm 1%	0gm 1%	59mg 20%	65gm 3%	0	22gm	0%/7%	1%/18%
Moose cooked	1gm 1%	0gm 1%	78mg 26%	69mg 3%	0	29g	0%/8%	1%/23%
Bison raw	16gm 25%	7gm 34%	70mg 23%	66mg 3%	0	19g	0%/0%	1%/14%
Bison cooked	15gm 23%	6gm 32%	83mg 28%	73mg 3%	0	24g	0%/0%	1%/17%
Antelope raw	2gm 4%	1gm 4%	95mg 32%	51mg 2%	0	22g	0%/0%	0%/18%
Antelope cooked	3gm 4%	1gm 5%	126mg 42%	54mg 2%	0	29g	0%/0%	0%/23%
Caribou raw	3gm 5%	1gm 6%	83mg 28%	57mg 2%	0	23g	0%/0%	2%/26%
Caribou cooked	4gm 7%	2gm 9%	109mg 36%	60mg 2%	0	30g	0%/5%	2%/34%
Pheasant raw	4gm 6%	1gm 6%	66mg 22%	37mg 2%	0	24g	3%/10%	1%/6%
Pheasant cooked	12gm 19%	4gm 18%	89mg 30%	43mg 2%	0	32g	4%/4%	2%/8%

There was a site of interest which reported the content of fat in traditional Native meat sources. These are listed below:

Table 32. Sources of Fat for the American Indian .

Meat Source	**Saturated**	**Monounsaturated**	**Polyunsaturated**
Antelope, kidney fat	65.04	21.25	3.91
Bison, kidney fat	34.48	52.36	4.83
Caribou, bone marrow	22.27	56.87	3.99
Deer, kidney fat	48.24	38.52	6.21
Dog, meat, muscle	28.36	47.76	8.95
Dog, kidney	25.54	41.85	7.69
Elk, kidney	61.58	30.10	1.62
Goat, kidney	65.57	28.14	0.00
Moose, kidney	47.26	44.75	2.11
Peccary, fatty tissues	38.47	46.52	9.7
Reindeer, caribou, fatty tissues	50.75	38.94	1.25
Seal (Harbor), blubber	11.91	61.41	13.85
Seal (Harbor), depot fat	14.51	54.23	16.84
Seal (harp), blubber	19.16	42.22	15.04
Seal (harp), meat	10.69	54.21	23.51
Sheep (mountain), kidney fat	47.96	41.37	2.87
Sheep (white faced), kidney fat	51.58	39.90	1.16
Sheep, intestine, roasted	47.01	40.30	7.46
Snake, meat	26.36	44.54	0.09
Squirrel (brown), adipose	17.44	47.55	28.6
Squirrel (white), adipose	12.27	51.48	32.3
Game fat, according to Eaton	38	32	30

APPENDIX C

USDA DIET BREAKDOWN

APPENDIX C

USDA DIET BREAKDOWN

USDA Recommendations

Following are the USDA recommendation as found on line: 45-65% of calories should be carbohydrates, and 20-35% of calories should be from fat. Since proteins are not mentioned the following was used for calculation for simplicity: 15-25% of calories should be from protein (this is an estimate). USDA does not mention protein, and what's left after max carbohydrates and max fat is 0%. Max after minimal fats and carbohydrates would be 35%. So one could expand this estimate to read 0-35% should be from protein, however this does not make sense, so it was modified to read 15-25%.

Table 33. USDA Summary.

	carbohydrates	**proteins**	**fats**	**calories**
carbohydrates	45-65%=			
Proteins		15-25%=		
Fats			20-35%=	
Calories of 2000cal diet	900-1300 calories	300-500 calories	400-700 calories	2000 calories

APPENDIX D

ADA DIET BREAKDOWN

APPENDIX D

ADA DIET BREAKDOWN

ADA meal plan

The following presentation list foods as recommended as a sample daily meal plan as per www.lifestyle.com

Breakfast: 5 ½ carbohydrate (3 bread/starch, 2 fruit, ½ milk)

1 protein

2 fat

Total carbohydrates: 80-85 grams

Lunch: 5 ½ carbohydrate (3 bread/starch, 1 fruit, 1 milk, 1 vegetable)

2 protein

2 fat

Total carbohydrates: 80-85 grams

Dinner: 5 ½ carbohydrates (3 bread/starch, 1 fruit, 1 milk, 1 vegetable)

4 protein

2 fat

Total carbohydrates: 80-85 grams

Afternoon or Evening snack:

2 ½ carbohydrate (2 bread/starch, ½ milk)

Total carbohydrates: 37 grams

This reveals a total of:

Table 34. ADA Summary.

	carbohydrates	**proteins**	**fats**	**total**
Carbohydrates	19 exchanges 19x15g= 245g	19x3g= 57g	19x trace=	245gx4=980 calories
Proteins	-	7x17g= 119g	unknown	176gx4= 704calories
Fats	-	-	6x5g=30g	30gx9=270+ calories
Calories	980 calories	704 calories	270+ calories	1954+ calories
Percent	<50.2%	<36%	>13.8%	100%