# THE EVALUATION OF THE EFFECTIVENESS OF A NUTRITION EDUCATION PROGRAM IN CONJUNCTION WITH A PHYSICIAN INVOLVING DIABETIC, HYPERTENSIVE, OBESE AND HYPOGLYCEMIC PATIENTS

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# CHAPTER I

## INTRODUCTION

"Major health problems are diet related. Most all of the health problems underlying the leading causes of death in the United States could be modified by improvements in the diet" (27, p. 1). Among these problems are atherosclerosis, hypertension and diabetes mellitus. These are diseases of the cardiovascular system and have been shown to be clearly related. All three of these diseases react favorably to dietary changes. Often they are associated with obesity (20).

Weir (27) states:

> Food habits are important in both the development and control of obesity. Traditional and family eating and cultural patterns are often conducive to overeating and obesity and contribute to the high incidence of obesity in some families (p. 76).

Another frequent medical condition very dependent on proper dietary treatment is hypoglycemia. Certain dietary changes are necessary to correct or control all of these conditions. Eating habits must be changed permanently.

Various methods have been used to help people change eating habits but often without long-term success. For example, Wylie (29) states that a hospital dietitian has previously given one diet instruction, as recommended by the physician, to the patient. This instruction may benefit the patient slightly, but usually the explanation is brief and given just before the patient is dismissed from the hospital. The patient

is probably anxious to leave the hospital and concentrating on dietary changes seems unimportant at the time. Under such circumstances there is little time for questions and often no follow-up program.

Another method used to modify eating behavior involves the physician giving the patient a diet sheet. The patient is expected to follow the diet. However, detailed explanation is rarely provided and the patient may not realize the importance of the diet or understand exactly how to undertake the necessary changes in eating habits. Also, the patient is not being re-educated to eat correctly. Rather, a sample menu is provided and the patient may have difficulty making adequate substitutions. In such a case the diet changes will probably be short term rather than permanent.

According to Mayer (19) the practicing physician does not have the time to spend the hours required to adequately advise patients about nutrition and its importance in health. Correcting misinformation about the caloric value of foods, giving advice on planning menus and recommendations concerning methods of food preparation need to be discussed with the patient. This job is best handled by a competent dietitian or the dietetic service of an out-patient department. These are only a few of the advantages of referring patients to a dietitian.

Adequate information pertaining to specific nutritional problems, information concerning which eating habits must be changed and how to change them and encouragement while these changes are occurring should be offered to most effectively help patients correct poor eating habits. A nutrition education program initiated in a physician's office under the direction of a dietitian and the physician could be an effective atmosphere to work with patients as they change old eating habits.

Although this kind of program is not currently practiced, it could be advantageous compared to other methods of attempting to change eating habits. A program of this description could be beneficial to patients during the process of changing eating habits. The patient would have a definite amount of time spent specifically on dietary instruction. The personal contact would offer the patient understanding, encouragement and motivation. Each session spent with the dietitian would focus on a specific aspect of nutrition. This method would require the patient to digest only a small amount of nutritional information at one time. The additional sessions would allow the patient to ask any necessary questions pertaining to specific nutritional problems that require the dietitian's assistance. The patient would be re-educated to make permanent eating habit changes. The importance of making the changes would be reinforced weekly for the duration of all the sessions. A nutrition education program of this type could be extremely effective in helping a patient make permanent diet changes that are essential for the patient's health.

> In the world of total health care, the skill of the physician and other health professionals is necessary but it is not sufficient. The patient cannot just accept passively -- he must participate actively. It is the patient who must alter his behavior if he is to maintain his health.... The behavior of people is altered only through knowledge, understanding and motivation. Knowledge and understanding are gained through education (24, p. 285).

A nutrition program should educate each participating individual about eating habits and the importance of improving eating habits. Hopefully a nutrition education program will motivate each patient to make permanent changes in eating habits and provide the understanding so necessary in making the changes.

## Statement of the Problem

There is a general lack of availability of nutrition counseling for patients with specific nutritionally linked medical conditions. Given proper nutrition information, patients would be able to follow proper dietary measures more accurately than if the nutrition information were not clearly presented and fully explained.

Dutra de Oliveira (12) states that recently the president of the American Society for Clinical Nutrition emphasized the need to accredit nutrition as a medical subspecialty in conjunction with pediatrics, internal medicine and surgery. Also suggested was the need to develop a program to advance nutrition in medical education and medical practice.

The importance of nutrition in controlling or preventing certain medical problems and maintaining good health has become a major concern in the past few decades. Lack of nutrition education is one cause of poor eating habits and these habits may lead to numerous medical problems. Providing a method of educating and motivating people to eat properly is critical if we are to have a healthier, more productive nation. Weir (27, p. 1) states, "Better health, a longer active lifespan and greater satisfaction from work, family and leisure time are among the benefits to be obtained from improved diets and nutrition."

## Purpose of the Study

The purpose of the study was to examine the effects of a nutrition education program (conducted in conjunction with a physician) on the dietary control of a sample of diabetic, hypertensive, obese and hypoglycemic patients. None of these patients were administered any medication to control the specific condition being studied. Any physiological,

biochemical or physical changes resulted from diet changes rather than medication. The effectiveness of the program was examined by measuring changes of certain criteria before and after the patient participated in the nutrition program. These changes were compared to changes that occurred in patients with similar medical problems but who did not participate in the nutrition education program. The difference in the changes in the two groups of patients was measured by comparing identical questionnaires answered by both groups of patients, by information obtained from each patient's medical chart and by laboratory findings.

## Objectives of the Study

The specific objectives of this study were:

1. to determine the effectiveness of a nutrition education program through assessment of a group of subjects (selected because of specific medical problems) who participated in the program;
2. to determine the differences in the physical symptoms of the patients before and after participating in the program;
3. to determine the patient's nutritional status by the collection of dietary information from each patient and clinical information determined from each patient's chart;
4. to analyze the improvement in the patient's eating habits after participating in the nutrition education program;
5. to make recommendations based on the effectiveness of the nutrition education program and nutritional status of the subjects regarding nutritional care of the patients.

## Hypotheses of the Study

Specifically, the following criteria were examined:

1. A. There will be no significant change as a result of the nutrition education program among diabetic patients concerning the following:
   (a) fasting blood sugar;
   (b) weight, if obese;
   (c) serum cholesterol level, if elevated;
   (d) serum triglyceride level, if elevated;
   (e) uric acid level, if abnormal.

   B. There will be no significant change as a result of the nutrition education program among the obese patients concerning the following:
   (a) weight;
   (b) blood pressure, if elevated;
   (c) serum cholesterol level, if elevated;
   (d) serum triglyceride level, if elevated;
   (e) uric acid level.

   C. There will be no significant change as a result of the nutrition education program among the hypertensive patients concerning the following:
   (a) weight, if obese;
   (b) blood pressure;
   (c) serum cholesterol level, if elevated;
   (d) serum triglyceride level, if elevated;
   (e) uric acid level, if obese.

D. There will be no significant change as a result of the nutrition education program among the hypoglycemic patients concerning the following:

(a) fasting blood sugar, if abnormal

(b) weight, if obese;

(c) serum cholesterol level, if elevated;

(d) serum triglyceride level, if elevated;

(e) frequency of headaches;

(f) frequency of weakness;

(g) frequency of nervousness.

2. There will be no significant difference in the patients who participated in the program and those who did not concerning improvement in the way they generally felt. This includes the frequency of nervousness, irritability, sluggishness, depression, headaches, fatigue and weakness.

3. There will be no significant change among all patients who participated in the program (determined by the original questionnaire given to the patient and a second questionnaire given approximately three to six months after completion of the program) concerning:

(a) how the patient generally felt;

(b) frequency of nervousness;

(c) frequency of irritability;

(d) frequency of headaches;

(e) frequency of depression;

(f) frequency of sluggishness (slowness to respond);

(g) frequency of craving for sweets;

(h) frequency of fatigue;

(i) frequency of weakness;

(j) frequency of dizziness.

4. There will be no change as a result of the nutrition education program concerning the patients' knowledge of nutrition.
5. There will be no significant improvement in the percentage of the Recommended Dietary Allowances of certain essential nutrients met by patients before and after participating in the program.

## Procedure

The following procedure was used to determine the effectiveness of the nutrition education program involved in this study:

1. The literature was reviewed.
2. The objectives were formulated.
3. A questionnaire was developed to determine specific information from each patient including physical symptoms, nutritional knowledge, a 24-hour recall of food intake and snacks most frequently consumed. The questionnaire was pre-tested and then revised. The 34 patients who attended the nutrition sessions answered the questionnaire during the first nutrition session and again three to six months after completion of the sessions. The 35 patients who did not attend the sessions answered the questionnaire three to six months after the physician had recommended a diet for the patient.

4. The 24-hour recall from all patients was analyzed for the consumption of calcium, iron, vitamin A, riboflavin and ascorbic acid and the percentage of the Recommended Dietary Allowances of these nutrients was determined.
5. Blood pressure, weight, blood sugar levels, serum cholesterol level, serum triglyceride level, uric acid level and blood urea nitrogen were collected from each patient's chart at the time the diet recommendations were made and three to six months later.
6. The data collected from the questionnaires and from each patient's chart was analyzed to determine changes in the data resulting from participation in the nutrition education program.
7. Conclusions and recommendations for future studies were made according to the results of the analysis.

## Definition of Terms

The following definitions were taken from Dorland's Illustrated Medical Dictionary (11):

Adipose - of a fatty nature; fatty; fat.

Atherosclerosis - an extremely common form of arteriosclerosis in which deposits of yellowish plaques (atheromas) containing cholesterol, lipoid material, and lipophages are formed within the itima and inner media of large and medium-sized arteries.

Diabetes mellitus - a metabolic disorder in which the ability to oxidize carbohydrates is more or less completely lost, usually due to faulty pancreatic activity, especially of the islets of Langerhans, and consequent disturbance of normal insulin mechanism.

Hyperglycemia - abnormally increased content of sugar in the blood.

Hypertension - persistently high arterial blood pressure. Various criteria for its threshold have been suggested ranging from 140 mm. Hg systolic and 90 mm. Hg diastolic to as high as 200 mm. Hg systolic and 110 mm. Hg diastolic.

Hypoglycemia - an abnormally diminished content of glucose in the blood, which may lead to tremulousness, cold sweat, pilorection, hypothermia, and headache, accompanied by confusion, hallucinations, bizarre behavior, and ultimately, convulsions and coma.

Lipogenesis - the formation of fat; the transformation of nonfat food materials into body fat.

Obesity - an increase in body weight beyond the limitation of skeletal and physical requirement, as the result of an excessive accumulation of fat in the body.

# CHAPTER II

## REVIEW OF LITERATURE

Much research has been done in the area of nutrition and its relationship to good health. Cassel (6) states that it is no coincidence that one of the major areas of interest to both health professionals and the social sciences should center around the subject of food. The role of food in health and disease has been under investigation by health workers since the beginning of medical history. The significance of good nutrition continues to advance as further advances in nutritional knowledge are made.

As research in nutrition progresses the importance of good eating habits becomes continually more apparent. Everyone has food habits that dictate the eating pattern of that individual. These habits may be good or bad. Regardless, they affect one's health -- either favorably or unfavorably. Numerous studies have been done on the effect of certain foods or components of food on the health of individuals.

### Sugar and Its Effect on Hyperlipidemia

MacDonald and Braithwaite (18) have shown that large loads of dietary carbohydrate have an effect on the blood lipid levels. The comparison of ingested sucrose and ingested starch was studied. The sucrose was shown to induce a rise in the plasma lipids.

Naismith and his workers (21) studied the interrelations of energy intake and sucrose and the effect of starch in the diet. The first study involved 23 healthy male students who consumed their self-selected diet for seven days. After the seven days a proportion of the starch was replaced with an equicaloric amount of sucrose. This involved about 200 grams of starch. These modified diets were consumed for 14 days and then the subjects went back to their normal diets for 14 days. Blood samples were taken at the beginning and end of the original seven days and at the end of the other two time intervals. The blood was analyzed for cholesterol, triglycerides and phospholipids. The first experiment increased the sucrose from 100 to 300 grams a day. The calories consumed were approximately the same. However, the amount of fat was slightly reduced to compensate for the increase in calories from the sucrose. The blood lipids were significantly increased in total cholesterol, triglycerides and phospholipids. When the subjects returned to their normal diets the blood lipids returned to their preliminary levels by the end of two weeks.

Another group of twelve subjects was studied by Naismith and his workers (21). The usual diets of the subjects were increased by 1800 kilocalories per day for 21 days. Basically, the extra calories were consumed from the same foods in the usual diet. However, six of the subjects had their sucrose intake reduced and the remaining six had their sucrose intake increased. The six subjects with the decreased consumption of sugar increased the amount of starch in the diet from 123 to 221 grams per day. The sucrose level was decreased from 73 to 41 grams per day. The proportion of energy value from carbohydrates was decreased and this resulted in an increase in energy value from

fats. The other six subjects had the consumption of starch reduced from 172 grams to 45 grams per day. The consumption of sucrose increased from 110 to 329 grams per day. The changes in the proportion of the energy value from carbohydrates and the energy value from fats were similar in both groups. The subjects consuming an increased amount of sucrose had significant rises in triglyceride levels. When the subjects returned to normal diets the triglyceride levels returned to the original levels. The triglyceride levels in those subjects on the low sucrose diets showed only a slight increase, probably because of surplus calories. The increase was not enough to be significant. The high sucrose diet subjects had an increase in cholesterol of 50 per cent above the normal level. No significant changes were detected in the serum cholesterol levels of the subjects on the low sucrose diet.

The results demonstrate a hyperlipidemic effect when starches were replaced with sucrose. The 60 per cent increase of energy intake had little or no effect on plasma triglycerides or cholesterol unless there was an increase in sucrose consumption. Those on the low sucrose diet had an increase of 120 grams of fat per day and yet there was no hyperlipidemic effect.

The death rates from arteriosclerotic and degenerative heart disease have increased over the past few years. This is particularly true in younger people (2). In the early nineteenth century there were many unexplained and sudden deaths. These deaths were labeled "apoplexy". Autopsies were performed on many of these people. The same atherosclerotic degeneration that seems to be the basis for our present pandemic was found in these individuals. The causes were said to be a sedentary life, a luxurious mode of living, too rich a diet, anxiety and stress.

Today these same criteria are the major factors related to degenerative heart disease.

According to Ahrens (2):

> Cigarette smoking, obesity, sedentary living and stress have all increased in frequency among the western population. The most striking dietary change has been a sevenfold increase in the consumption of sucrose (p. 403).

Progressive increase in research of nutrition and its relationship to health strongly indicates that sucrose is a critical factor associated with coronary heart disease, hypertension and diabetes mellitus.

After nine years of experience with hyperlipidemia, Ahrens (2) identified two distinct types of hyperlipidemia. One of these was induced by dietary fats. Patients were used as self-controls when customary diets were changed to isocaloric high carbohydrate formula diets, an increase in the amount of serum triglycerides was found. Because the high blood lipid levels occurred soon after the high carbohydrate diet, Ahrens and his collaborators suspected that the carbohydrates were transformed into excess triglycerides. It is apparent from these findings that the fatty acid elevation is a direct result of lipogenesis from the dietary carbohydrate instead of a result of transfer from adipose tissue.

As reported by Ahrens (2), Mann and his co-workers were able to reduce the serum triglyceride levels in a group of subjects by an average of 22 per cent over a period of five months through a program of volunteer sucrose restriction. However, the reduction in serum triglyceride levels was related to a significant weight reduction that occurred during the period of the study.

One of the reasons that the sucrose increased the blood lipids was that it increased the blood pressure. The serum cholesterol is also

increased in animals and man on a high sucrose diet. However, this increase is not as high as the increase in triglycerides (2).

Ahrens (2) stated that the most carefully designed studies have shown that atherosclerotic heart disease victims do consume more sucrose. There have been differences in the amount of sucrose consumed and some have tried to attribute the atherosclerotic heart disease to an increased consumption of coffee or cigarettes in the group eating the most sucrose; however, it is relevent to observe that the pandemic of atherosclerotic heart disease continues to increase on a worldwide scale in rough proportion to the increase in sucrose consumption, but not in proportion with the saturated fat intake.

Yudkin and Roddy (30) studied 70 men ages 45-66 by giving them questionnaires. Of the 70 patients, 20 had recently experienced myocardial infarctions, 25 had peripheral artery disease, and 25 were control patients. The questionnaire consisted of a complex diet history. The two groups of men with arterial disease showed nearly twice as much sugar in the diet as the control group. The patients with peripheral arterial disease were shown to have the degree of atherosclerosis proportional to the amount of consumed sugar.

There have been several risk factors for heart disease in the United States that have been identified. These include family history, sex, age, smoking, stress, blood pressure, diabetes, overweight, lack of exercise, blood cholesterol and blood triglycerides.

Weir (27) states that a great deal of attention has been given to the possible relationship between heart disease and diet. Many conditions are associated with an alteration in fat metabolism. This reflects in increased levels of serum cholesterol or serum triglycerides.

When the relationship between diet and heart disease, hypertension, diabetes mellitus, hypoglycemia, obesity and many other health problems is recognized, we see that eating properly is vital for control of these problems. Only by changing eating habits permanently will we see an improvement in these conditions.

## Hypertension

If hypertension is not controlled one sees progressive health problems. Hunt (15) states that sustained hypertension usually goes on for 20 years or more. This subjects the arteries to slow but steadily progressive changes. Both the diastolic and systolic pressure cause lipids and other atherogenic materials to enter into the wall faster. Sometimes it is too fast for the artery wall to clear out these materials. This results in an accumulation of atheromatous material in the wall itself. A damaged vessel wall accumulates atheromatous deposits faster than an undamaged wall.

Hypertension is directly related to atherosclerosis. This is partially true because of the nutritional risks associated with hypertension. These risks include increased dietary sodium, increased dietary cholesterol and obesity. These factors are also associated with atherosclerosis.

Hunt (15) claims that high blood pressure accelerates atherogenesis. If blood pressure is reduced there will be a sharp reduction in the atherosclerotic process. Hypertension greatly accelerates the atherosclerotic process. This could be because of the effect hypertension has on the vessel wall as the elevated pressure pushes lipids and

cholesterol into the vessel wall, or just from the stress of added pressure on the arterial wall itself.

According to Hunt (15) the nutrients that we think either produce or accentuate hypertension are saturated fats, cholesterol and sodium. As weight increases, blood pressure, blood cholesterol and blood glucose increase. As weight decreases, blood pressure and blood lipids decrease.

Mayer (20) states that there is substantial evidence that an increased intake of cholesterol and long chain saturated fatty acids leads to the development of atherosclerosis. Dietary habits that include foods rich in these substances are difficult to change in adults because these habits were probably formed during childhood.

An elevation of blood fats and/or blood pressure increases the risks of heart disease. The amount of lipids circulating in the blood are primarily regulated by the quality and quantity of dietary fats. According to Mayer (20, p. 39), "Hypertension or high blood pressure is the most common cardiovascular disease. It is a factor in increasing the risk of death from coronary heart disease or strokes and it affects some 20 million Americans." In the United States one-fifth to one-third of all hypertensives are markedly overweight (20).

## Diabetes Mellitus

According to Mayer (20) obesity is a predisposing factor of diabetes mellitus. This disease is the fifth cause of death in the United States.

As defined by Skillman and Tzagournis (24):

> Diabetes mellitus is a disorder of carbohydrate, protein and lipid metabolism and is classically characterized by hyperglycemia and glycosuria. The central disturbance is an

> abnormality in secretion or effect of insulin or both. The insulin deficiency may be relative or absolute (p. 7).

Skillman and Tzagournis (24) discuss the four stages of diabetes mellitus (see Table I).

The first stage is commonly known as prediabetes. This stage extends from conception to the first demonstration of glucose intolerance. During this period the person responds as a non-diabetic in terms of carbohydrate tolerance.

The second stage is termed latent chemical diabetes. During this state abnormal carbohydrate tolerance can be demonstrated. Excess stress such as pregnancy, infection or surgery may cause reversible abnormal glucose levels or glycosuria during this period.

The third stage, chemical diabetes, may be characterized by an abnormal response to the standard glucose tolerance test. The fasting blood sugar level may be normal or only minimally elevated. However, after the glucose is administered an abnormally high rise in the blood glucose level will be detected.

The fourth stage of diabetes mellitus is overt diabetes. The diagnoses of the overt diabetic is based on post absorptive hyperglycemia. Polydipsia, polyphagia and/or polyuria are usually present. Deterioration of the diabetic state may result in ketoacidosis. The undiagnosed mild maturity-onset diabetic may remain undiagnosed until pathologic changes affecting the kidneys, eyes, nervous system or major arteries occur.

According to Weir (27) over 50 per cent of diabetes mellitus and other carbohydrate disorders would be avoided or improved by improved diet. In diabetes mellitus the body does not metabolize carbohydrates

TABLE I

CLASSIFICATION OF DIABETES MELLITUS BY STAGES

| State | FBS | Glucose Tolerance Test | Symptoms | Other Characteristics |
|---|---|---|---|---|
| I Prediabetes | Normal | Normal | None | May have capillary basement membrane. |
| II Latent Chemical Diabetes | Normal | Normal | Rare (reactive hypoglycemia) | May temporarily see abnormal GTT with pregnancy, infections, cortisone. |
| III Chemical Diabetes | Usually Normal | Abnormal | Occasional | Usually see an increased and delayed insulin response. |
| IV Overt Diabetes | Abnormal | Abnormal | Usual | As fasting hyperglycemia increases, the insulin response becomes inadequate. |

Source: Skillman, Thomas G. and Tzagournis, Manuel, "Diabetes Mellitus," The Upjohn Co. (1973).

normally. This could be because the body is unable to convert the carbohydrates to the stored form of carbohydrates, glycogen, or because the carbohydrates cannot be utilized for energy required by normal body functions. After a carbohydrate intake the serum glucose level increases and then decreases at a slower-than-normal rate. This is associated with a deficiency or inadequate utilization of insulin.

Progression of diabetes mellitus results in a derangement in the metabolism of fats and proteins. Degenerative vascular disease, weight change, extreme tiredness, leg pain, eye trouble, sudden weakness, frequent urination, thirst, itching, and appetite change may be seen in diabetes mellitus.

According to Skillman and Tzagournis (24), clinical symptoms and signs of diabetes may be different according to the age of the diabetic. Diabetic children usually have an abrupt onset of the classical diabetic symptoms. These may include weight loss, polyuria, polydipsia and easy fatigability. Commonly, the diagnosis of childhood diabetes is made when the child has been taken to the hospital in a state of diabetic acidosis. Adult diabetics may experience symptoms of reactive diabetes years before being diagnosed as diabetic. These symptoms may include sweating, palpitation, tremor and weakness. Typically, these hypoglycemic symptoms occur three to five hours after a high carbohydrate meal. Over 75 per cent of maturity-onset diabetics are overweight at the time of diagnosis.

According to West (28) many different factors can produce or increase the risk of diabetes mellitus. The two most important factors are obesity and genetic factors. Adult-onset diabetes occurs much more frequently than the youth-onset diabetes. Obesity is present in about

three-fourths of the adult-onset diabetics. Only a small number of youth-onset diabetics are overweight.

Nutritional factors have been suspected to affect the risk of diabetes mellitus for a long time. West (28) states that the changing dietary patterns in Japan, Israel and Africa have been associated with a profound increase in the rates of diabetes. West (28) states that the studies that he and Kalbfleish conducted with other collaborators from eleven countries indicated a strong relationship of diabetes mellitus prevalence and nutritional factors. West (28) also states that a recent review of available data on the past and present rates of diabetes mellitus in aboriginal populations of the New World (Indians, Eskimos, Polynesians and Microneasians) suggested a strong relationship of diet and the risk of diabetes mellitus. Differences in the nutritional factors and amounts of exercise in these populations probably account for differences as great as tenfold in the rates of diabetes mellitus. The degree and duration of adiposity is the strongest and most consistent factor associated with adult-onset diabetes.

According to West (28) increased rates of diabetes have frequently been observed in populations where sugar intake has increased. West (28) also concluded that most intrapopulation studies show that adiposity is a strong risk factor of diabetes mellitus. Cleave (9) and Cohen, Teitelbaum and Saliternih (10) support the belief that the consumption of refined carbohydrates, including sucrose and other "refined" carbohydrates is the main precipitating factor in diabetes mellitus.

## Hypoglycemia

Another medical problem related to carbohvdrate metabolism is hypoglycemia. According to the U.S. Department of Health, Education and Welfare (16):

> Hypoglycemia is a technical term meaning a level of sugar [glucose] in the blood which is lower than normal. It usually occurs several hours after eating and is manifested variously by sweating, trembling, palpitation, hunger, weakness and lightheadedness (p. 1).

Hypoglycemia occurs when the blood sugar level drops below the normal level. The blood sugar levels are regulated by many factors. The main factor regulating the blood sugar level is the dietary intake of carbohydrates. All of these carbohydrates are converted to sugar by the digestive process. This causes the secretion of the hormone insulin from the pancreas. The purpose of insulin is to facilitate the entry of sugar (glucose) into the body cells. This provides the body with energy required for normal body functions. The brain is one part of the body that requires a constant supply of blood sugar for its normal activity. Most hypoglycemia results from the overproduction of insulin by the pancreas (16).

About 70 per cent of hypoglycemia is of a functional nature. This means that the blood sugar is burned up too quickly. However, no organ or tissue of the body is anatomically abnormal. Functional hypoglycemia usually responds to a diet that is high in protein and low in carbohydrates. The meals should be divided into at least six feedings spaced throughout the day (16).

## Obesity

Obesity is a problem with cardiovascular disease patients because of its association with hypertension and diabetes mellitus. Although obesity itself is not considered a cause of death it is associated with increased mortality from other conditions. Diabetes mellitus, hypertension and possibly coronary heart disease are significantly associated with obesity (27). Obesity places an increased load on the heart and respiratory system. Reduction in weight to normal levels increases the likelihood of success in treating these health conditions. Weir (27) states that good nutrition and maintenance of normal weight may prevent many health conditions from becoming debilitating.

Almost three million adolescents (ten per cent) in the United States are estimated to be seriously overweight (27). About 30 to 40 per cent of adults are overweight and 60 to 70 per cent of adults over 40 years of age are overweight. Obesity is more prevalent in women than in men and is more likely to occur as age increases. The largest increase in weight occurs in the 20- to 30-year age group.

According to Weir (27), diseases such as diabetes mellitus, gall bladder disease, gout, kidney and digestive diseases, hypertension and coronary heart disease are significantly associated with obesity. Obesity also increases surgical risks, is a hazard in pregnancy, places a greater workload on the heart and circulatory system and increases the work of breathing.

Much research has been done on various aspects of obesity, particularly the causes and treatment. Many factors influence obesity. Among these factors are genetic, physiological, psychological, culture,

activity, food habits and an individual's way of life. The direct cause of obesity, however, is the consumption of more calories than the caloric expenditure.

Another important factor in the development of an obese person is the amount of physical exercise by that individual. When exercise is decreased so is the caloric expenditure. If calories are not reduced as exercise is reduced the person will begin to gain weight.

The development and control of obesity are largely dependent upon food habits. The establishment of poor food habits may be the cause of a high incidence of obesity in some families.

According to Weir (27) food preferences may be established as early as three years of age. Food provides many satisfactions besides nutritional needs. It is difficult to change bad food habits because it may require making changes in living habits. The difficulty in making permanent adjustments in eating or living patterns is one of the main reasons for lack of success in weight reduction by regulation of the diet.

Consumption of food is biologically necessary for growth, energy and maintenance of health. Food is also involved with intellectual and emotional health.

Babcock (3) discusses some of the emotional values of food. The first of these is to relieve anxiety. A young mother hears her baby cry and feels anxious. Feeding the baby relieves the mother of her anxieties. Some people may overcome anxiety by consuming huge amounts of food to feel stronger. Therefore, changing eating habits may require a change in the way an individual handles tensions.

Food can be used to influence others or to affect the response and behavior of another individual. Certain foods can be used to represent

discipline, punishment, threats or deprivation. This is a type of non-verbal communication. Depriving someone of eating (a form of pleasure) for punishment may cause one to feel successful. Frequent or prolonged deprivation could lead to malnutrition.

Food increases one's acceptance and security in society. An individual may associate a certain food with a past bad experience. Therefore, eating the food at a later time reminds the person of a bad experience and threatens his security.

One of a baby's first experiences is eating. This experience could be pleasurable, frightening, happy or frustrating. All of these emotions have a great deal to do with how foods are accepted at the time. Association of foods with certain emotions continues throughout life.

Many obese children have certain similar characteristics. Often they are immature, overdependent, lack aggressiveness and have a domineering mother. The child may use food as an outlet for hostile and aggressive feelings. Many obese adults have similar eating patterns.

Frequently psychological factors seem to be related to obesity. Mayer (19) divides obesity into two types -- reactive obesity and developmental obesity. Reactive obesity is when one eats to compensate for tension and frustration. Depression leads to overeating. Often the "night eating syndrome" occurs because this is probably the most depressing time of the day for many adults. Usually reactive obesity occurs in middle-age adulthood.

Developmental obesity is a common form of obesity during childhood. Frequently overweight children will have been used by one or both his parents to fulfill the parents' need or to compensate for frustration or failure in the parents' lives.

All of the previously mentioned conditions require certain dietary changes to control the condition. Dietary changes mean changing food habits. These changes must be permanent.

## Food Habits

Defined by Clark (8):

> A food habit is not a passing whim or fancy, it is a feature of society and is integrated into a structure of social values that may have nothing much to do with the principles of nutrition. But the food habit itself may be a harmless or wholesome one (p. 51).

Food habits, like all other habits, are formed. Therefore, they can be reformed if desired or necessary. Certain medical conditions require a change in eating habits and this is not necessarily easy to accomplish.

Hunt (15) reports that our eating habits are quite different than they were before World War II. Fast-food restaurants and convenience foods have become a way of life for our mobile society. Unfortunately, many of the convenience foods and highly processed foods are much higher in sodium and fat, usually saturated fat. Also fast-food service means a higher calorie count.

Changes in the lifestyle of families today have affected not only eating habits but also meal preparation and menu planning. According to Weir (27) fewer meals are eaten as a family group. Snacks provide about 20 per cent of the total day's calories and more than one-third of all meals are eaten away from home. Traditionally the knowledge of food preparation was passed from mother to daughter. However, times have changed. Many mothers work today and simply are not at home to educate their daughters about food preparation. We see a continual

change in food preparation because of new foods which are constantly appearing on the market. Planning balanced meals is more difficult today because of the vast number of highly refined foods. More knowledge about correct food preparation is necessary if the nutritional value of diets is to improve.

According to Hochbaum (13) eating is an activity that is intimately interwoven with a host of other things that are important. The food intake is part of an intricate habit system embedded in one's psychological makeup, in social and physical environments and in one's total lifestyle. Therefore, eating behavior, like all behavior is highly complex and may be resitant to change. Most people's food intake is motivated by many learned and habitual forces. These include taste preferences, visual and olfactory senses, psycho-social-cultural influences, economic and situational conditions, and their emotional state.

## Nutritional Assessment

According to Christakis (7) three basic methods are employed in determining a person's nutritional status. Dietary studies such as a 24-hour recall can be used to compare nutrient intakes with accepted nutrient intake standards to determine possible deficiencies. Clinical studies may be used to evaluate physical signs of nutritional health or disease. Laboratory investigations provide biochemical measurement of nutrients within the body. These methods are used separately or collectively to assess either certain aspects or total nutritional status.

Dietary histories are limiting since nutritional requirements differ among individuals. Slight differences in an individual's nutrient

intake and the Recommended Dietary Allowances set by the National Academy of Science Food and Nutrition Board may not indicate malnutrition.

Christakis (7) states five ways that food intake may be measured. These include:

1. a 24-hour recall of all food eaten;
2. records of food eaten by an individual kept by specific measurement over a stated period of time;
3. a self-administered questionnaire or interview to obtain general dietary data;
4. a diet history usually obtained by a trained interviewer to determine the amounts of foods eaten over an extended period of time;
5. laboratory studies measuring nutritive values of all foods eaten and calculations of all food portions. Usually this method is only used by research groups.

Christakis (7) states that physical symptoms of malnutrition can be valuable in detecting nutritional deficiencies. However, malnutrition can occur before the resulting physical symptoms are evident.

The evaluation of nutritional status by laboratory methods is more objective and in certain of the measurements more precise than dietary methodology or clinical assessment measures. For example, levels of blood lipids such as cholesterol and triglycerides and serum glucose levels are implicated in heart disease, diabetes and other chronic diseases (7).

According to Christakis (7) physicians in evaluation of coronary heart disease intervention programs are using serum cholesterol and triglyceride levels to assess response to diets designed to lower these

lipids. The current interest in serum lipids has been generated by:

a. Serum cholesterol identified by the Framingham study as a risk factor in coronary artery disease. Also identified as risk factors are hypertension, smoking, obesity and other determinants.

b. The indication that the lowering of serum cholesterol by nutritional means has been attended by reduced coronary heart disease mortality and morbidity.

c. The emergence of the hyperlipidemias having possible public health significance.

Christokis (7) states that nutritional assessment of adults must be especially devoted to cardiovascular disease, obesity and diabetes mellitus. It might be divided into four major nutritional classifications. These are:

1. those with an excessive amount of calories (usually from carbohydrates or fats);
2. those with deficiencies of calories or essential nutrients;
3. those with special nutritional problems such as ulcerative colitis, regional ileitis, alcholism, etc.;
4. those with non-nutritional problems. The medical problems of adult life (with the exception of the elderly) in the United States are more likely to be associated with nutritional excesses rather than deficiencies.

Since the leading cause of mortality in the adult population is coronary heart disease (7) this might be considered a prototype to indicate the approach to employ in nutritional assessment. Health histories should emphasize major risk factors such as smoking, a family history of

hypertension, diabetes mellitus, heart disease and obesity. The minimal adult physical examination in the coronary risk group should include urinalysis, electrocardiogram, fasting serum glucose and lipids such as cholesterol and triglycerides.

According to Butterworth and Blackburn (5) there are three basic methods to determine a patient's nutritional status. These methods include the nutritional history, the physical examination and the laboratory findings.

Some of the guidelines recommended by Butterworth and Blackburn (5) for the nutritional history include:

Part I

1. The usual body weight (particularly if it is 20 per cent over or under desirable);
2. A recent loss or gain of 10 per cent of the usual body weight;
3. Evidence that income and meals are not adequate for needs;
4. More than half of the meals eaten away from home;
5. If the patient lives alone and prepares own meals;
6. If the patient has ill-fitting dentures;
7. If the use of alcohol is excessive;
8. If the use of fad or monotonous diets is frequent;
9. If the patient has chronic disease of the gastrointestinal tract;
10. If the patient is known to have diabetes, hypertension, hyperlipidemia, coronary heart disease or malabsorption;
11. If the patient has had recent major surgery, illness or injury.

Part II

1. A description of recent food consumption patterns, eating habits and meal consumption;
2. Circumstances of food purchasing, storage and preparation in the home;
3. Estimate of daily average caloric consumption;
4. Estimate of energy expenditure;
5. Estimate of possible nutrient deficiencies, based on specific imbalances.

Part III

1. Estimate of actual food consumption;
2. Estimate of fluid intake;
3. Estimate of stool frequency and urinary loss;
4. Behavior patterns, eccentricities, vomiting (including surreptitious vomiting);
5. Careful recording of body weight at regular intervals.

Butterworth and Blackburn (5) recommend the following guidelines to be used in the physical examination to determine nutritional assessment:

1. General appearance -- obese? skinny?
2. Head -- bossing, deformities, crainotabes (under 1 year old)
3. Eyes -- opthalmoplegia, cataracts, xerosis, Bitot's spots, retinal hemorrhage, papilledema, night blindness
4. Mouth -- glossitis, gingivitis, caries, periodontal disease, chellosis, ageusia, dysegeusia
5. Nose -- anosmia, dysomia, nasolabial seborrhea
6. Skin -- pallor abnormal pigmentation (carotenemia, hemochromatosis), follicular hyperkeratosis, bruises, perifollicular petechiae, pellagrous dermatitis, flaky-paint dermatitis, fistulas, status of wound healing, subcutaneous fat and skin-fold thickness, edema
7. Hair -- easy-pluckability, sparseness, depigmentation
8. Nails -- friability, bands and lines
9. Neck -- goiter
10. Heart -- enlargement, high-output failure, resting tachycardia

11. Lungs -- none? Use of accessory muscles to breathe?
12. Abdomen -- enlarged (fatty) liver, distended loops of bowel, ascites, varices
13. Genito-urinary -- secondary sexual characteristics, hypogonadism, delayed onset of puberty
14. Skeletal -- epiphyseal thickening, bowing, rachitic rosary, osteoporosis, frog leg position, tenderness
15. Muscle -- atrophy, wasting, hemorrhage, pain
16. Joints -- effusions, arthralgia
17. Neurol -- foot drop, confabulation, improper position and vibratory sense, hyperreflexia, hyporeflexia, irritability, convulsions (p. 10).

Routine laboratory findings can yield remarkably accurate information about the patient's nutritional status. The key to adopting laboratory findings in nutritional assessment is the collective results. For example, abnormally low levels of prothrombin activity, serum calcium and serum carotene may have separate explanations. However, collectively they may be the result of abnormal fat absorption affecting the functional status of the patient regarding the fat-soluable vitamins A, D and K.

There are also a number of specialized procedures used to aid in the precise characterization of the status regarding specific nutrients. These laboratory tests may include serum ascorbic acid, plasma vitamin A, plasma carotene, serum folacin, serum vitamin $B_{12}$, thiamin in urine, riboflavin in urine and many others. Also to be considered are certain drug-nutrient interactions. For example, certain antibiotics may inhibit the growth of bacteria in bacterial assay systems for vitamins. Contraceptive steroid agents may spuriously elevate vitamin A levels, reduce certain metal binding proteins and lead to lowered circulating levels of folate, vitamin $B_{12}$ and other vitamins in some cases.

## The Dietitian's Role in Educating

Dietitians must keep in mind the psychosocial factors that affect eating behavior. Therefore, a nutrition education program must not only teach the benefits of good nutrition and how to make meals healthful and enjoyable but also must strive to educate people about how to change eating habits.

Hunt (15) states that if the physician will take time to understand what good nutrition can do for people, he will see it as a powerful weapon that can often keep his patient out of trouble because he may not need other powerful weapons. If the physician believes in good nutrition he is far better equipped to motivate the patient toward improving nutrition.

It is important for the physician to become very familiar with the specific nutritional principles for various medical conditions. Only then can the physician explain these principles and motivate the patient to follow a proper diet before sending the patient to a dietitian. Merely giving the patient a standard printed diet offers little support or motivation.

According to Hunt (15) one of the biggest problems in patient compliance is that if a patient is merely given a standard printed diet regimen to follow it is conveyed that diet is not really a significant factor in therapy. If the patient feels that the diet is not important to the physician it will not be important to the patient either.

If the physician has a positive approach to dietary control the patient is likely to take diet changes seriously. The patient must be convinced that diet is an important part of the therapy.

Hunt (15) states that physicians often omit the dietitian from the health care team and that it is a mistake for him to do so. The health care team should include the dietitian as a visible and functional component.

The dietitian has specialized training in the physiology of food and its ethnic and social implications (15). Therefore, the dietitian can use an individualized approach with each patient in developing the prescribed nutritional program. Hunt (15) states that the physician needs to establish a definite relationship with the dietitian. If there is no dietitian available he must spend time to develop effective nutrition educational aids to help his patients with diet. Few physicians have the time to develop such aids.

Today dietitians have the added responsibility of incorporating the most advanced scientific knowledge into nutrition education programs. According to Bosley (4) the dietitians and nutritionists of this decade have a different and more important role than ever. This is because much more scientific knowledge is available and specific diagnoses and identification of the magnitude of nutrition and/or nutrition related problems are recognized. The nutritionist-dietitian is a translator of highly scientific knowledge into practical everyday application. Today's broader knowledge of nutrition translated in a form comprehensive to all of the population in every country is essential. The application of the broad knowledge of nutrition can prevent the level of nutritional status which is economically non-productive. The broader knowledge of the treatment of nutritional related diseases requires the adaptation of specialized diets to cultural food practices and to the resources available to patients.

When working with patients regarding their nutritional health it is important that good rapport between the dietitian and the patient be established (14). The dietitian must be authoritative but not bossy. Sympathy and willingness to listen are important. The dietitian must be capable of explaining scientific and medical details in simple language. If the relationship between the dietitian and the patient is not a good and healthy relationship, the patient will not benefit from the dietary instruction nearly as much as if the patient and the dietitian have a good relationship. Unless the dietitian and patient have an open and comfortable relationship the translation of scientific knowledge presented by the dietitian will not be adequately interpreted by the patient.

Bosley (4) states that as the general attitudes toward the importance of nutrition changes there is a greater need for specialists to translate the vast store of scientific knowledge into services and actions that will benefit people. Nutritionists and dietitians have a unique opportunity to demonstrate their capabilities beyond the traditional areas of work.

Nutrition education should be a growth-producing process (20). The patient begins with a special diet and progresses to food consciousness and an awareness of nutrition as scientific knowledge and research.

> Nutrition plays too great a role in health to be a 'hit-or-miss, one-shot affair' after a medical crisis. Nutrition professionals are now seeking to move nutrition education from the treatment of disease to health planning (29, p. 505).

According to Wylie (29) there are seven stages the dietitian should follow when planning a nutrition education program. They are the following:

1. The dietitian must have some method of making contacts with the patients. This could be a referral system.
2. Learning the patient's past nutritional habits is important. One method of doing this is a 24-hour recall.
3. Developing rapport and mutual respect are required if a nutrition education program is successful.
4. All information that is presented by the dietitian should be introduced objectively. The dietitian should not be opinionated in discussing nutrition with patients.
5. The dietitian must examine the value system and priorities of the patient and incorporate this knowledge into the diet.
6. A focal point should be expanding nutrition consciousness rather than incorporating the memorization of diet rules.
7. Finally, the dietitian must see that the patient achieves independence and begins to use the dietitian only as a resource for nutrition.

> The goal of nutritional counseling should be a growing independence by the counselee such that he will be able to find nutritional information to make rational decisions (29, p. 505).

The dietitian must seek to enable patients to be capable of making independent nutritional decisions. Nutrition counseling involves a behavior modification concerning eating habits. "The provision and eating of food are concrete actions, and advice is only effective when the person counseled accepts and puts the advice into practice" (23, p.13). It is the role of the dietitian to make nutrition information understandable to the patients.

There should be an active interchange between the dietitian and the patient. Only when the patient makes a definite commitment to apply the advice as a changed or modified behavior has the consultation been successful. Dietary counseling should include exploration of the patterns of food intake, living habits affecting and utilization of food, and money available for food and cooking (23).

Hunt (15) states that certain criteria are important in providing an effective nutrition education program. These criteria include:

1. Give the patient the feeling that you believe in what you are telling him.
2. Give the patient enough information that he will believe in it.
3. Anticipate problems that the patient may have with the diet. For example, eating out or grocery shopping.
4. Establish good communication with the patient.
5. Relate nutrition to health.
6. Be positive. Use the word "control" rather than restrict.
7. Make diet flexible. The diet must fit into the patient's lifestyle. If he cannot follow the diet he will feel guilty and will not want to return for future help.

## Preventive Nutrition

From a therapeutic viewpoint there is a specific need to change incorrect eating behavior to eliminate or control a medical problem. However, preventive nutrition is concerned with preventing or delaying future medical problems.

The real potential from improved diet is preventive (27). If the dietitian is able to work with a patient's nutritional health before a problem exists, the problem may never exist or at least be delayed. Weir (27) believes that most nutritionists and clinicians feel that the real potential from improved diet is preventive in that it may defer or modify the development of a disease state so that a clinical condition does not develop. According to Johnson (17) the dietitian must be prepared to handle many different aspects of nutrition when striving for preventive nutrition. Nutritional information is not always available for the sick and much too little is being done in the area of preventive nutrition in the total care of healthy persons.

The total responsibility of educating patients in the area of preventive nutrition belongs to the dietitian. Effectiveness in this area will be beneficial to many people in future good health. Weir (27) states that major health benefits are long range. Predictions of the extent to which diet may be involved in various health problems have been based on knowledge of abnormal metabolic pathways developed by persons in advanced stages of diseases and current knowledge of the metabolic pathways of nutrients. There is little understanding of why or when certain metabolic changes take place. The human body is not only very complex but also a very adaptive mechanism. Most of the essential metabolic processes have alternate pathways that can be utilized in response to physiological, diet or other stress. Frequently when a series of adjustments take place the ultimate results do not become apparent for a long time. It may even take years for the results of an accumulation of a metabolite such as cholesterol to become apparent. The early adjustment of diet could prevent the development of undesirable long-

range effects. Making minor changes in diet and food habits at an early age might well avoid the need for making major changes later in life.

The benefits of proper nutrition are many. Weir (27) states that the benefits from an improved diet are reflected in better overall general health and well-being. According to Mayer (20) the current problem in practicing prevention is how to help these individuals, how to offer them effective aid to alter dietary and exercise habits. Physicians simply do not have time or expertise for such services. The need for community and hospital-based nutrition counseling by qualified health professionals is clear. Instruction for effective adherence to palatable, acceptable diets -- whether it be for the control of calories, saturated fats, simple sugars or salt -- is time consuming. It demands sound knowledge of food purchasing and preparation. The dietitian is the health professional best equipped with the knowledge of nutrition. Proper nutrition is vital for good health and it is the dietitian who can most effectively educate people concerning proper nutrition.

# CHAPTER III

## METHOD AND PROCEDURES

This study was designed to determine the effectiveness of nutrition education among patients under the care of a physician for specific medical conditions. The objectives stated in Chapter I were planned to be accomplished using the following procedures:

1. selection of the subjects,
2. development of the instrument,
3. pre-testing the instrument,
4. conducting the nutrition education sessions,
5. collection of the data,
6. analysis of the data,
7. recommendations for the future development of nutrition education programs in conjunction with physicians.

### Selection of the Subjects

This study included a total of 69 patients. All of the patients were from Oklahoma City and were selected from the practice of one physician with whom the researcher had previous contact. Each subject had one or more medical problems directly related to nutrition. These specific medical problems included diabetes mellitus, hypertension, obesity, hypoglycemia or a combination of these problems.

The subjects were selected after being diagnosed by the physician as having one or more of these medical problems. If the physician felt that the patient would participate in the nutrition education program the subject was contacted regarding participation in the program. The patients who attended the nutrition sessions were referred to as Group I. None of the patients in Group I were using any medication to control the medical condition at the time of involvement in this study.

Another group of subjects with one or more of the same medical problems but who were not involved in the nutrition education program were also selected. These patients were designated as Group II and were studied as the control group. Some of the patients in Group II were using medication in conjunction with diet to control the medical condition. The subjects in both groups were given diet recommendations by the physician. A food list of the carbohydrate content of many fruits and vegetables was given to the subjects in both of the groups (Appendix A). Basic dietary instructions pertaining to the use of the food list in each patient's specific diet were given by the physician and/or the nurse.

## Description of the Subjects

The patients ranged in age from 19 to 67 years. Fifteen patients in each category (diabetic, hypertensive, obese and hypoglycemic) who participated in the program and fifteen in each category who did not participate in the program were studied. Since some of the patients had more than one of the aforementioned conditions (for example, a subject could be diabetic and hypertensive), a total of 69 subjects were

studied. Table II shows a breakdown of the medical classification of all patients involved in the study.

## Development of the Questionnaire

A questionnaire (Appendix B) was developed by the researcher in order to acquire some of the data. This was pre-tested by twenty people and revised following the suggestions received.

The basis for the development of the questionnaire was to record physical symptoms of each subject, to determine the basic nutritional knowledge of each subject and to obtain a 24-hour recall of foods normally eaten by each subject. The questionnaire then served as an indicator of each subject's nutritional knowledge and the practice of that knowledge. The information was valuable in selecting specific nutritional information to emphasize with individual patients. For example, the patient was asked to list the basic four food groups and to tell how many servings are recommended from each group. If this could be answered accurately it was an indication that the patient was already somewhat informed about nutrition. Also, it indicated that it might not be necessary to spend as much time discussing the basic four food groups than if the person were not familiar with these groups. Each patient was also asked which foods were good sources of vitamin A and vitamin C. Once again, this was indicative of the patient's nutritional knowledge.

Each patient was further asked for a 24-hour recall of all foods eaten. This information was used to determine the foods that were normally eaten. The foods were to be listed as eaten within certain time spans during the 24 hours recalled. This helped to determine the frequency of meals. Finally, this information was analyzed to determine

TABLE II

MEDICAL CLASSIFICATION OF PATIENTS

| Medical Classification(s) | Number of Patients in Group I | Number of Patients in Group II |
|---|---|---|
| Diabetic Only | 3 | 3 |
| Hypertensive Only | 2 | 1 |
| Hypoglycemic Only | 8 | 11 |
| Obese Only | 3 | 2 |
| Diabetic and Hypertensive | 2 | 2 |
| Diabetic and Hypoglycemic | 1 | 0 |
| Diabetic and Obese | 3 | 3 |
| Hypertensive and Hypoglycemic | 0 | 1 |
| Hypertensive and Obese | 3 | 4 |
| Hypoglycemic and Obese | 1 | 1 |
| Hypertensive, Diabetic and Hypoglycemic | 3 | 2 |
| Hypertensive, Hypoglycemic and Obese | 2 | 0 |
| Hypertensive, Diabetic and Obese | 3 | 5 |
| Total Number of Patients in Each Group | 34 | 35 |

if each patient met 100 per cent of the Recommended Dietary Allowances for calcium, iron, vitamin A, riboflavin and ascorbic acid.

## The Nutrition Interviews and Sessions

The nutrition sessions were planned on the basis of the needs of the patients, the physician's past experience in working with patients requiring special diets and the practical application of the diet to each patient's lifestyle. Although the sessions varied somewhat in content according to various medical conditions and needs of individual patients, basically the sessions included information as indicated in Appendix C.

Information was obtained by interviewing each subject. The interviewer was the researcher. The interview was conducted in the first of four sessions included in the nutrition education program. The first session was one hour in length and in all cases included only the interviewer and the subject. The remaining three sessions were one-half hour in length at weekly intervals. In many cases two or three patients were seen together with the researcher for the follow-up sessions. These sessions consisted of information that the researcher and physician felt was pertinent and important for the patients to know regarding the specific diet to be followed according to the medical diagnosis. However, a few of the patients felt comfortable with the diet after only two or three sessions and others attended as many as six or eight sessions. The follow-up sessions offered further and more detailed information pertaining to specific needs and allowed the patients ample opportunity for questions.

## Session I

Each patient was seen alone for the first one-hour session. During the first part of the hour (usually about fifteen minutes) the patient answered the questionnaire. After the questionnaire was completed the researcher read it to detect special nutritional problems.

An introduction to the program was then presented. The relationship of the patient's medical problem or problems to nutrition and the diet was explained. For example, why the diabetic should eliminate concentrated carbohydrates (candy, sugared beverages, pastries, etc.) from the diet would be discussed with a diabetic patient. Good eating habits were discussed and, finally, the actual diet recommendations were made. Nutrition labeling and how it can be used to aid a person on a special diet were discussed. The patient was given a food record (Appendix D) and requested to list all foods eaten for one week. The food record was to be returned at the following session.

## Session II

The second session lasted one-half hour. First, the researcher scanned the food record returned by the patient and made any necessary recommendations. Particular emphasis was given to good and nutritious snacks and the role of vitamins and minerals in the diet. The patients were taught to plan nutritious snacks. The importance of a diet adequate in vitamins and minerals, their role in health and good sources of vitamins and minerals were discussed. Usually patients had a number of questions by the second session and time was allowed for these.

## Session III

This session focused on how to cook for special diets and how to preserve nutrients during the preparation of foods. For example, this session with obese people included how to cut calories from food by the preparation method. Finally, information pertaining to eating away from home was presented and discussed.

## Session IV

Meal planning was one topic discussed during this session. This included contrasts in color, texture, temperature and method of meal preparation. Ideas for cutting costs from the weekly food budget were presented. Time was designated for questions.

## The Laboratory Findings

Information concerning laboratory data (Appendix E) and medical treatment were also recorded from each patient's chart as a further indication of nutritional status. Depending on the patient's medical problem (diabetes mellitus, hypertension, obesity, hypoglycemia or any combination of these) certain types of laboratory work were done. For example, glucose tolerance tests were administered to diabetic and hypoglycemic patients. Blood chemistries including fasting blood sugar level, serum cholesterol level, serum triglyceride level, uric acid level and blood urea nitrogen were given to most of the diabetic, hypertensive and obese patients. Weight and blood pressure were recorded regularly.

## Collecting the Data

The data was collected at the two time periods. For the patients in Group I the first time period referred to when the patient started participating in the nutrition program after the physician's diet recommendations. The second time period was three to six months after completion of the sessions. The first time period for Group II referred to when the physician first made the diet recommendations and the second time period was three to six months later.

The data collected from the patients in Group I included the questionnaire administered at the first and second time periods and laboratory findings, weight and blood pressure obtained from each patient's chart at both time periods. In most cases the blood chemistries, weight and blood pressure were recorded several days before the first session. In some cases this information was collected approximately one month before the patient was able to attend the first session. The second questionnaire was called the post-test. It was identical to the first questionnaire except for different introductory and concluding paragraphs. In some cases the questionnaires were answered in the physician's office when the patient had an appointment. Other questionnaires were mailed to the patients and returned either by mail or in person.

The data collected from the patients in Group II included the questionnaire answered at the second time period in the physician's waiting room when the patient had an appointment. The laboratory findings, weight and blood pressure were collected at both time periods.

## Analysis of the Data

The pre-test and post-test for each patient in Group I were compared to determine the changes in how each patient responded to the questions at the two time periods. The 24-hour recall from each questionnaire was evaluated by a computer program at Oklahoma State University based on the U.S.D.A. Handbook No. 72, "Nutritive Value of Foods" (22).

The daily intake of calcium, iron, vitamin A, riboflavin and ascorbic acid were calculated according to the 1974 Recommended Dietary Allowances. These two intakes were then compared to determine the nutrient adequacies or deficiencies on the basis of meeting 100 per cent of the Recommended Dietary Allowances.

The 24-hour recalls taken from the questionnaires of the patients in Group II at the second time period were evaluated in the same way. The adequacies or deficiencies of the same nutrients were compared to the patients in Group I at the second time period.

The differences in how the patients in Group I answered the pre-test and post-test were compared. The post-test information was compared to the questionnaires answered by the patients in Group II at the second time period.

Finally, the laboratory findings, weight and blood pressure at the first time period of the patients in Group I were compared to the same data collected at the second time period. The laboratory findings, weight and blood pressure at the first time period of the patients in Group II were compared to the same data collected at the second time period. The laboratory findings, weight and blood pressure of both groups of patients at the second time period were then compared.

# CHAPTER IV

# RESULTS AND DISCUSSION

## Introduction

In this study the researcher attempted to show the effectiveness of a nutrition education program conducted in conjunction with medical treatment by a physician. The effectiveness of this program was demonstrated by comparing two groups of subjects. Group I included the patients who attended planned nutrition sessions conducted by the researcher. These patients were diagnosed as diabetic, hypertensive, obese, hypoglycemic or a combination of these conditions. None of the patients in Group I were using any medication to control the medical condition or conditions studied.

Group II included the patients in the control group. This group did not attend the nutrition sessions. The patients in Group II had also been diagnosed as having one or more of the previously mentioned conditions. However, some of the patients in Group II were using medication in conjunction with diet recommendations prescribed by the physician. The physician and/or the nurse had given both groups of patients a list of foods to be allowed or avoided and a brief explanation pertaining to the use of those foods in each patient's diet.

The data is presented in terms of the first time period (the original data collected) and the second time period (the data collected three to six months after the original data). For Group I (those patients who

attended the nutrition sessions) the first time period referred to data collected at the beginning of the program. The second time period referred to data collected three to six months after completion of the sessions. For Group II (those patients who did not attend the nutrition sessions) the first time period referred to data collected when the patient was first selected to be in the control group after being diagnosed as having one or more of the conditions studied and given diet recommendations by the physician. The second time period referred to data collected three to six months later. Group II only answered one questionnaire and this was at the second time period.

The following comparisons for the patients in Group I and Group II were made:

1. the differences in the responses on the questionnaire answered by each patient in Group I at both time periods and by each patient in Group II at the second time period;
2. the difference in the percentages of the Recommended Dietary Allowances of calcium, iron, vitamin A, riboflavin and ascorbic acid consumed at both time periods for Group I and the second time period for both groups;
3. the difference in the following laboratory findings at both time periods for each group:
   a. blood sugar levels,
   b. serum cholesterol level,
   c. serum triglyceride level,
   d. uric acid level,
   e. blood urea nitrogen;
4. the difference in the following laboratory findings at the second time period for both groups:

a. blood sugar levels,

b. serum cholesterol level,

c. serum triglyceride level,

d. uric acid level,

e. blood urea nitrogen;

5. the differences in the blood pressure and weight at both time periods for each group;

6. the differences in the blood pressure and weight at the second time period for both groups.

## Analysis of the Data

The purposes of providing the questionnaires were to determine the frequency of physical symptoms experienced by each patient, each patient's knowledge of nutrition, the kinds and frequency of snacks consumed and to obtain a 24-hour recall of all foods eaten by each patient. The comparison of the differences in each patient's response to the questionnaire was used as an indication of the effectiveness of the program in helping each patient change eating habits.

The purpose of question one was to determine how each patient generally felt most of the time. The respondents were to evaluate how they generally felt in terms of the following categories: poor, fair, good or excellent.

Eleven of the 34 patients in Group I felt poor at the first time period. None felt poor at the second time period. Six of the 35 patients in Group II felt poor at the second time period. Fourteen patients in Group I felt fair at the first time period while six felt fair at the second time period. Fourteen patients in the Group II felt fair

at the second time period. Nine of the patients in Group I felt good at the first time period while 26 reported feeling good at the second time period. Fourteen patients in Group II reported feeling good at the second time period. None of the patients in Group I felt excellent at the first time period while two did at the second time period. One patient in Group II felt excellent at the second time period.

Table III shows the comparison of the medical condition breakdown of how the patients in Group I reported feeling at both time periods. Table IV shows the comparison of the medical condition breakdown of the patients in both groups at the second time period. The difference in the data reported here and that reflected in the chart is due to the fact that some patients had more than one diagnosis.

Questions two through ten refer to specific physical symptoms experienced by patients. Table V shows how all patients responded to each question. In general, the patients in Group I showed a significant improvement in general health from the first to second time period. This group also showed a statistically significant improvement in general health at the second time period according to the t-test as compared to Group II. This data is divided into the four medical classifications and is shown in Table VI.

## Diabetic Patients

The mean change according to the t-test values in how both groups of diabetic patients responded to each question at the second time period is shown in Table VI. There were statistically significant changes at the .05 level in the diabetic patients in Group I at the second time period pertaining to general feelings and the frequency of nervousness,

TABLE III

COMPARISON OF HOW THE PATIENTS IN GROUP I GENERALLY FELT AT BOTH TIME PERIODS

| Number of Patients | First Time Period | | | | | Number of Patients | Second Time Period | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Poor | Fair | Good | Excellent | | | Poor | Fair | Good | Excellent |
| 15 | 4 | 5 | 6 | 0 | Diabetics | 15 | 0 | 2 | 11 | 2 |
| 15 | 4 | 6 | 5 | 0 | Hypertensives | 15 | 0 | 4 | 10 | 1 |
| 15 | 5 | 7 | 3 | 0 | Obese | 15 | 0 | 2 | 13 | 0 |
| 15 | 7 | 4 | 4 | 0 | Hypoglycemics | 15 | 0 | 4 | 10 | 1 |

TABLE IV

COMPARISON OF HOW BOTH GROUPS OF PATIENTS FELT AT THE SECOND TIME PERIOD

| Number of Patients | Group I | | | | | Number of Patients | Group II | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Poor | Fair | Good | Excellent | | | Poor | Fair | Good | Excellent |
| 15 | 0 | 2 | 11 | 2 | Diabetics | 15 | 1 | 7 | 6 | 1 |
| 15 | 0 | 4 | 10 | 1 | Hypertensives | 15 | 1 | 7 | 6 | 1 |
| 15 | 0 | 2 | 13 | 0 | Obese | 15 | 2 | 7 | 6 | 0 |
| 15 | 0 | 4 | 10 | 1 | Hypoglycemics | 15 | 5 | 4 | 6 | 0 |

TABLE V

COMPARISON OF HOW ALL PATIENTS RESPONDED TO THE FREQUENCY OF PHYSICAL SYMPTOMS

| | Most of the Time | | | Often, but not Most of the Time | | | A Fair Amount of the Time | | | Very Little of the Time | | | Never | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Frequency of: | Group I 1st T.P. | Group I 2nd T.P. | Group II 2nd T.P. | Group I 1st T.P. | Group I 2nd T.P. | Group II 2nd T.P. | Group I 1st T.P. | Group I 2nd T.P. | Group II 2nd T.P. | Group I 1st T.P. | Group I 2nd T.P. | Group II 2nd T.P. | Group I 1st T.P. | Group I 2nd T.P. | Group II 2nd T.P. |
| Nervousness | 7 | 0 | 7 | 7 | 2 | 11 | 9 | 8 | 11 | 11 | 23 | 5 | 0 | 1 | 1 |
| Irritability | 6 | 0 | 6 | 5 | 2 | 6 | 9 | 7 | 7 | 14 | 25 | 16 | 0 | 0 | 0 |
| Sluggishness | 11 | 0 | 9 | 13 | 3 | 7 | 5 | 8 | 8 | 5 | 22 | 9 | 0 | 1 | 2 |
| Depression | 4 | 2 | 5 | 3 | 6 | 2 | 12 | 7 | 12 | 14 | 17 | 14 | 1 | 2 | 2 |
| Headaches | 4 | 1 | 3 | 3 | 0 | 9 | 5 | 4 | 2 | 20 | 21 | 14 | 2 | 8 | 7 |
| Craving Sweets | 11 | 1 | 8 | 3 | 3 | 3 | 8 | 17 | 13 | 10 | 19 | 11 | 2 | 4 | 0 |
| Fatigue | 10 | 1 | 9 | 14 | 5 | 11 | 9 | 11 | 8 | 1 | 17 | 7 | 0 | 0 | 0 |
| Weakness | 5 | 0 | 6 | 3 | 1 | 4 | 6 | 4 | 6 | 19 | 24 | 15 | 1 | 5 | 4 |
| Dizziness | 1 | 0 | 0 | 5 | 2 | 2 | 4 | 1 | 5 | 19 | 20 | 23 | 5 | 11 | 5 |

1st T.P. = First Time Period; 2nd T.P. = Second Time Period; Total Number of Patients = 69.

TABLE VI

COMPARISON OF THE MEAN RESPONSES OBTAINED BY THE T-TEST VALUES FOR THE PATIENTS IN BOTH GROUPS AT THE SECOND TIME PERIOD

| | Diabetic Patients | | | | Hypertensive Patients | | | |
|---|---|---|---|---|---|---|---|---|
| Variable | Group I Mean | Group II Mean | T | P | Group I Mean | Group II Mean | T | P |
| General Feelings | 5.00 | 3.93 | 2.26 | S | 4.60 | 3.93 | 1.39 | NS |
| Nervousness | 3.53 | 5.67 | -3.14 | S | 3.93 | 5.53 | -2.24 | S |
| Irritability | 3.53 | 4.87 | -2.17 | S | 3.80 | 3.80 | .00 | NS |
| Sluggishness | 3.80 | 5.40 | -2.12 | S | 4.07 | 5.27 | -1.72 | NS |
| Depression | 4.47 | 4.47 | .00 | NS | 4.60 | 4.33 | .32 | NS |
| Headaches | 3.27 | 3.13 | .17 | NS | 3.40 | 3.27 | .20 | NS |
| Craving Sweets | 3.67 | 5.00 | -1.67 | NS | 3.40 | 5.27 | -2.87 | S |
| Fatigue | 4.33 | 5.93 | -2.22 | S | 4.33 | 6.07 | -2.50 | S |
| Weakness | 2.87 | 4.06 | -1.52 | NS | 2.73 | 3.93 | -1.72 | NS |
| Dizziness | 2.73 | 2.73 | .00 | NS | 2.47 | 3.13 | -1.54 | NS |

.05 Significant Level; S = Significant; NS = Not Significant; N = 15 in each group for each medical classification.

TABLE VI (CONTINUED)

| Variable | Obese Patients | | | | Hypoglycemic Patients | | | |
|---|---|---|---|---|---|---|---|---|
| | Group I Mean | Group II Mean | T | P | Group I Mean | Group II Mean | T | P |
| General Feelings | 4.73 | 3.53 | 2.95 | S | 4.60 | 3.13 | 2.71 | S |
| Nervousness | 3.67 | 6.60 | -5.05 | S | 3.53 | 5.93 | -3.82 | S |
| Irritability | 3.53 | 5.00 | -2.38 | S | 3.93 | 5.80 | -2.59 | S |
| Sluggishness | 3.67 | 5.40 | -2.38 | S | 3.67 | 6.47 | -3.37 | S |
| Depression | 4.07 | 4.60 | -0.70 | NS | 4.47 | 5.27 | -0.96 | NS |
| Headaches | 2.73 | 3.93 | -1.72 | NS | 2.87 | 5.67 | -3.96 | S |
| Craving Sweets | 4.87 | 5.93 | -1.31 | NS | 2.87 | 5.40 | -3.80 | S |
| Fatigue | 4.47 | 6.60 | -3.35 | S | 4.20 | 6.47 | -3.07 | S |
| Weakness | 2.87 | 4.47 | -2.27 | S | 3.00 | 5.27 | -2.83 | S |
| Dizziness | 2.60 | 3.27 | -1.28 | NS | 2.60 | 3.53 | -1.54 | NS |

.05 Significant Level; S = Significant; NS = Not Significant; N = 15 in each group for each medical classification.

irritability, sluggishness and fatigue. However, the changes in the frequency of depression, headaches, craving sweets, weakness and dizziness were not statistically significant.

## Hypertensive Patients

Also shown in Table VI is the mean change according to the t-test values in how both groups of the hypertensive patients responded to each question at the second time period. There were statistically significant changes at the .05 level in the hypertensive patients in Group I at the second time period pertaining to the frequency of nervousness, craving sweets and fatigue. There were changes in the general feelings of the patients and the frequency of irritability, sluggishness, depression, headaches, weakness and dizziness but the changes were not statistically significant.

The hypertensive patients in Group I were on no medication for hypertension because their blood pressure was not as high as the blood pressure of those patients in Group II. If their blood pressure had been much above normal the patients would have been on medication for hypertension and could not have been included in Group I. Further, it is not uncommon for a hypertensive patient to have no abnormal physical symptoms. The patient may be hypertensive yet have no unusual feelings.

## Obese Patients

The mean change according to the t-test values in how both groups of obese patients responded to each question at the second time period is shown in Table VI. There were statistically significant changes at the .05 level in the obese patients in Group I at the second time

period pertaining to general feelings and the frequency of nervousness, sluggishness, fatigue and weakness. Although there were changes in the frequency of irritability, depression, headaches, craving sweets and dizziness the changes were not statistically significant.

## Hypoglycemic Patients

Table VI shows the mean change according to the t-test values in how both groups of hypoglycemic patients responded to each question at the second time period. There were statistically significant changes at the .05 level in the hypoglycemic patients in Group I at the second time period pertaining to general feelings and the frequency of nervousness, irritability, sluggishness, headaches, craving sweets, fatigue and weakness. There was a change in frequency of depression and dizziness but it was not statistically significant.

## Analysis of Other Questionnaire Responses

Number 15 on the questionnaire requested patients to list their favorite and most frequent snacks. Snacks were classified according to the nutrient composition of the snacks and the approximate nutrient density.

In all cases those patients in Group I consumed more nutritious snacks and fewer "empty calorie" snacks at the second time period than the first time period. With the exception of one patient all of the patients in Group I consumed more nutritious and less "empty calorie" snacks at the second time period than those patients in Group II. This data is compiled in Figure I.

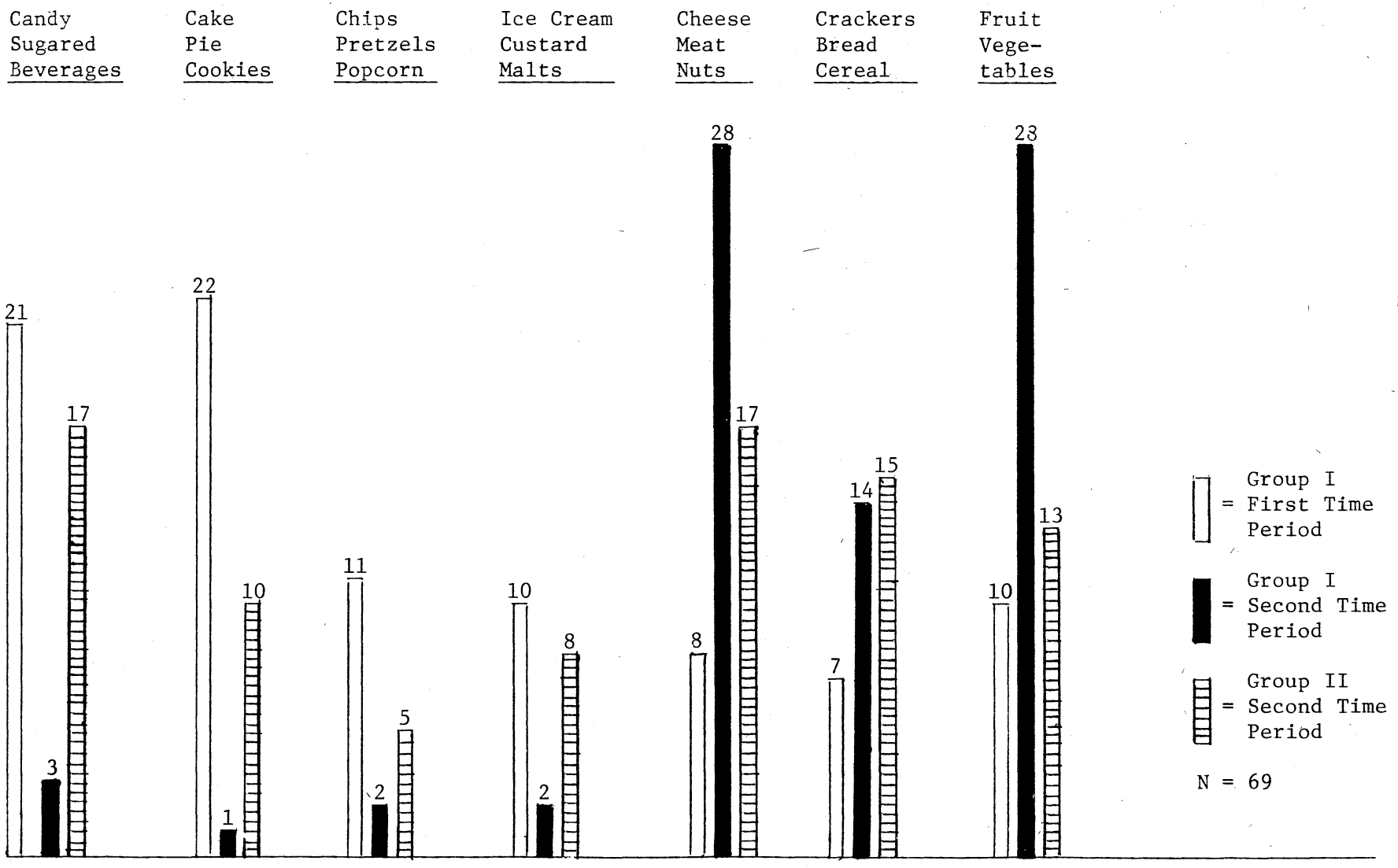


Figure 1. Comparison of Snacks Consumed by all Patients

Question 26 concerned the frequency that cakes, pies and candy were consumed. For the purposes of this study the data reported will be the most frequent consumption of either cake, pie or candy at both time periods for Group I and at the second time period for Group II. Of the 34 patients in Group I either cake, pie or candy was consumed daily by 14 patients, two to four times a week by nine patients, once a week by seven patients, once a month by three patients and never by one patient at the beginning of the program. At the second time period cake, pie or candy was consumed daily by one patient, two to four times a week by one patient, once a week by four patients, once a month by 13 patients and never by 15 patients.

Of the 35 patients in Group II cake, pie or candy was consumed daily by five patients, two to four times a week by ten patients, once a week by eight patients, once a month by six patients and never by six patients. Group II never consumed as many of these snacks as Group I at the first time period because they had already been recommended the diet by the physician three to six months previously.

Number 30 on the questionnaire asked patients to name the basic four food groups. At the first time period three of the 34 patients in Group I knew the basic four food groups. Twenty-three of the 34 patients knew the basic four food groups at the second time period. Two of the patients in Group II knew the basic four food groups at the second time period.

Questions 31 and 32 asked patients to select foods from a provided list which were good sources of vitamin A and vitamin C. Three of the 34 patients in Group I knew five or more good sources of vitamin C and two of the 34 patients knew five or more good sources of vitamin A at

the first time period. Twenty-four of the 34 patients knew five or more good sources of vitamin A at the second time period. None of the 35 patients in Group II knew five or more good sources of either vitamin A or C at the second time period.

## Analysis of Nutrient Consumption

Table VII shows the mean consumption of nutrients for all patients. A large increase is noticed in the mean consumption of calcium for Group I from the first to the second time period. One explanation for this is that milk was emphasized in the sessions as an excellent source of calcium. The overall consumption of milk increased in the diets of the patients in Group I from the first to the second time period. The consumption of iron decreased slightly with those patients in Group I. This was attributed to the limitation of high cholesterol foods for those patients with an elevated cholesterol level. Many of the foods rich in iron are also high in cholesterol. The mean intake of vitamin A increased tremendously. However, as indicated in Table VIII there was no difference in the number of people increasing their consumption of vitamin A. Instead, the difference was in those people already consuming the Recommended Dietary Allowances increasing their consumption. The change in the mean consumption of riboflavin could also be explained by the increased consumption of milk. Although the mean consumption of ascorbic acid met the Recommended Dietary Allowances for all patients there was quite an increase for those patients in Group I from the first to the second time period.

Table VIII shows the actual number of patients in each group who met the Recommended Dietary Allowances. In all cases more people in

TABLE VII

MEAN CONSUMPTION OF NUTRIENTS FOR ALL PATIENTS

| Patients | Number of Patients | Calcium mg. | Iron mg. | Vitamin A I.U. | Riboflavin mg. | Ascorbic Acid mg. |
|---|---|---|---|---|---|---|
| Group I 1st T.P. | 34 | 485.29 | 11.73 | 2614.00 | 1.11 | 54.26 |
| Group I 2nd T.P. | 34 | 923.14 | 12.03 | 10882.00 | 1.61 | 143.73 |
| Group II 2nd T.P. | 35 | 510.80 | 13.14 | 4142.00 | 1.20 | 64.17 |

1st T.P. = First Time Period; 2nd T.P. = Second Time Period.

TABLE VIII

NUMBER OF PATIENTS MEETING THE RECOMMENDED DIETARY ALLOWANCES

| Patients | Number of Patients | Calcium | Iron | Vitamin A | Riboflavin | Ascorbic Acid |
|---|---|---|---|---|---|---|
| Group I 1st T.P. | 34 | 9 | 0 | 5 | 4 | 11 |
| Group I 2nd T.P. | 34 | 19 | 9 | 5 | 16 | 34 |
| Group II 2nd T.P. | 35 | 6 | 5 | 0 | 10 | 14 |

1st T.P. = First Time Period; 2nd T.P. = Second Time Period.

Group I met the Recommended Dietary Allowances at the second time period than the patients in Group II.

Table IX shows the percentages of all patients who met the Recommended Dietary Allowance for the five nutrients studied. In all cases except for vitamin A there were almost or more than twice the number of patients in Group I at the second time period meeting the Recommended Dietary Allowances than those in Group II.

The statistical significance as obtained by t-test values of the changes from the two time periods in meeting the Recommended Dietary Allowances for the nutrients studied for the patients in Group I is shown in Table X. The changes in the consumption of calcium, iron, riboflavin and ascorbic acid were all statistically significant at the .05 level. There was no change in the number of people meeting the Recommended Dietary Allowances for vitamin A and so no statistically significant level is available.

Table XI shows the mean change as reflected by t-test values in nutrient consumption for the patients in Group I at both time periods. The mean change in nutrient consumption for the second time period of those patients in both groups is shown in Table XII. The increase in nutrient consumption was statistically significant for all nutrients except iron for all patients in Group I.

The lack of the statistical significance in the consumption of iron for the patients in Group I can be attributed to the limitation of many of the foods that are excellent sources of iron but also high in cholesterol. These foods were limited for people with elevated serum cholesterol levels.

TABLE IX

THE PERCENTAGES OF ALL PATIENTS MEETING THE RECOMMENDED DIETARY ALLOWANCES OF NUTRIENTS

| Patients | Number of Patients | Calcium | Iron | Vita-min A | Ribo-flavin | Ascorbic Acid |
|---|---|---|---|---|---|---|
| Group I 1st T.P. | 34 | 26 | 0 | 15 | 48 | 32 |
| Group I 2nd T.P. | 34 | 56 | 26 | 15 | 47 | 100 |
| Group II 2nd T.P. | 35 | 17 | 14 | 0 | 28 | 40 |

1st T.P. = First Time Period; 2nd T.P. = Second Time Period; N = 69.

TABLE X

STATISTICAL SIGNIFICANCE OBTAINED BY T-TEST VALUES OF THE MEAN CHANGES IN MEETING THE RECOMMENDED DIETARY ALLOWANCES FOR GROUP I

| Variable | Mean Change From First to Second Time Period | T | P |
|---|---|---|---|
| Calcium | .2941 | 2.54 | S |
| Iron | .2647 | 3.45 | S |
| Vitamin A | .0000 | -- | NS |
| Riboflavin | .3529 | 4.24 | S |
| Ascorbic Acid | .6764 | 8.31 | S |

.05 = Significant Level; S = Significant; NS = Not Significant; N = 34.

TABLE XI

T-TEST VALUES REFLECTING THE MEAN CHANGE IN NUTRIENT CONSUMPTION FOR GROUP I AT BOTH TIME PERIODS

| Diabetic Patients | | | | Hypertensive Patients | | | |
|---|---|---|---|---|---|---|---|
| Variable | Mean Intake | T | P | Variable | Mean Intake | T | P |
| Calcium mg. | 384.93 | 2.72 | S | Calcium mg. | 454.93 | 3.75 | S |
| Iron mg. | -0.03 | -0.03 | NS | Iron mg. | -0.50 | -0.38 | NS |
| Vitamin A I.U. | 8386.26 | 3.45 | S | Vitamin A I.U. | 7709.93 | 4.82 | S |
| Riboflavin mg. | 0.52 | 4.12 | S | Riboflavin mg. | 0.30 | 2.95 | S |
| Ascorbic Acid mg. | 70.13 | 2.86 | S | Ascorbic Acid mg. | 75.60 | 3.10 | S |
| **Obese Patients** | | | | **Hypoglycemic Patients** | | | |
| Variable | Mean Intake | T | P | Variable | Mean Intake | T | P |
| Calcium mg. | 394.60 | 3.53 | S | Calcium mg. | 526.86 | 3.85 | S |
| Iron mg. | -0.46 | -0.47 | NS | Iron mg. | 0.53 | 0.47 | NS |
| Vitamin A I.U. | 10389.46 | 4.44 | S | Vitamin A I.U. | 6169.80 | 7.40 | S |
| Riboflavin mg. | 0.391 | 2.63 | S | Riboflavin mg. | 0.60 | 4.92 | S |
| Ascorbic Acid mg. | 78.73 | 6.44 | S | Ascorbic Acid mg. | 116.67 | 8.31 | S |

.05 = Significant Level; S = Significant; NS = Not Significant; N = 15 in each medical classification.

TABLE XII

T-TEST VALUES REFLECTING THE MEAN CHANGES IN THE NUTRIENT CONSUMPTION FOR BOTH GROUPS AT THE SECOND TIME PERIOD

| Variable | Group I Second Time Period Mean | Group II Second Time Period Mean | T | P |
|---|---|---|---|---|
| Calcium | 9.23 | 5.10 | 4.8812 | S |
| Iron | 12.03 | 13.14 | -1.1306 | NS |
| Vitamin A | 10882.19 | 4142.08 | -1.12 | NS |
| Riboflavin | 1.61 | 1.20 | 3.9427 | S |
| Ascorbic Acid | 143.73 | 64.17 | 6.0530 | S |

.05 = Significant Level; S = Significant; NS = Not Significant; N = 69.

Table XIII shows the minimum and maximum ranges of the five nutrients studied for all patients. In all cases except iron, the minimum and maximum amount of nutrients consumed were greater at the second time period for Group I than for the first time period and also greater than Group II at the second time period.

TABLE XIII

COMPARISON OF THE RANGES OF NUTRIENT CONSUMPTION FOR ALL PATIENTS

| Patients | | Calcium mg. | Iron mg. | Vitamin A I.U. | Ribo-flavin mg. | Ascorbic Acid mg. |
|---|---|---|---|---|---|---|
| Group I | Minimum | 82.00 | 6.00 | 591.00 | 0.31 | 17.00 |
| 1st T.P. | Maximum | 1465.00 | 17.70 | 9621.00 | 2.15 | 375.00 |
| Group I | Minimum | 384.00 | 7.90 | 2345.00 | 1.11 | 49.00 |
| 2nd T.P. | Maximum | 1928.00 | 21.30 | 38103.00 | 3.10 | 256.00 |
| Group II | Minimum | 38.00 | 5.90 | 863.00 | .60 | 6.00 |
| 2nd T.P. | Maximum | 1302.00 | 28.90 | 14840.00 | 1.98 | 277.00 |

1st T.P. = First Time Period; 2nd T.P. = Second Time Period; N = 69.

## Analysis of Laboratory Data

Table XIV shows the mean changes in fasting blood sugar, peak blood sugar, low blood sugar, serum cholesterol level, serum triglyceride level, uric acid level and blood urea nitrogen for those patients in both groups. The minus signs show a decrease and the plus signs show an increase in changes. The statistical significance as obtained by t-test values of each change is shown in Table XV.

It was significant that eight of the 15 diabetic patients in Group II were using medication to lower blood sugar. None of the 15 diabetic patients in Group I were using any medication to control diabetes. The

TABLE XIV

MEAN CHANGES IN BLOOD CHEMISTRIES

| Patients | Number of Patients | Fasting Blood Sugar mg. % | Peak Blood Sugar mg. % | Low Blood Sugar mg. % | Serum Cholesterol mg. % | Serum Triglycerides mg. % | Uric Acid mg.% | Blood Urea Nitrogen mg. % |
|---|---|---|---|---|---|---|---|---|
| Group I: | | | | | | | | |
| Diabetic | 15 | -5.13 | -82.50 | -8.00 | -22.09 | -107.23 | -3.92 | +0.83 |
| Hypertensive | 15 | -21.36 | -- | -- | -25.60 | -76.87 | -5.10 | +0.22 |
| Obese | 15 | -2.00 | -- | -- | -30.71 | -91.18 | -0.53 | -1.26 |
| Hypoglycemic | 15 | -9.00 | -104.00 | -1.00 | -26.67 | -65.75 | -3.33 | -1.25 |
| Group II: | | | | | | | | |
| Diabetic | 15 | -10.93 | -70.00 | -3.50 | -19.78 | +39.09 | +5.08 | +1.77 |
| Hypertensive | 15 | -4.40 | -70.00 | -3.50 | -22.13 | +16.22 | +5.09 | +0.86 |
| Obese | 15 | -10.25 | -88.00 | -9.00 | -12.23 | +29.50 | -5.60 | +0.50 |
| Hypoglycemic | 15 | +10.38 | +4.75 | -1.00 | -4.43 | -16.25 | -2.00 | -1.67 |

TABLE XV

COMPARISON OF THE MEAN CHANGES IN BLOOD CHEMISTRIES AS REFLECTED IN T-TEST VALUES FROM THE TWO TIME PERIODS FOR BOTH GROUPS

| | Group I | | | Group II | | |
|---|---|---|---|---|---|---|
| Variable | Mean Change | T | P | Mean Change | T | P |
| | | | Diabetic Patients | | | |
| Fasting Blood Sugar | -5.13 | -1.57 | NS | -10.93 | -1.33 | NS |
| Peak Blood Sugar | -82.50 | -3.84 | NS | -70.00 | -3.89 | NS |
| Low Blood Sugar | -8.00 | -1.14 | NS | -3.50 | -0.64 | NS |
| Serum Cholesterol | -22.09 | -2.86 | S | -19.78 | -1.57 | NS |
| Serum Triglycerides | -107.23 | -3.68 | S | +39.09 | +1.23 | NS |
| Uric Acid | -3.92 | -1.48 | NS | +5.08 | +0.94 | NS |
| Blood Urea Nitrogen | +0.83 | +0.93 | NS | +1.77 | +2.85 | NS |
| | | | Hypertensive Patients | | | |
| Fasting Blood Sugar | -21.36 | -2.10 | NS | -4.40 | -0.44 | NS |
| Peak Blood Sugar | -- | -- | NS | -70.00 | -3.89 | NS |
| Low Blood Sugar | -- | -- | NS | -3.50 | -0.64 | NS |
| Serum Cholesterol | -25.60 | -4.76 | S | -22.13 | -1.99 | NS |
| Serum Triglycerides | -76.87 | -2.37 | S | +16.22 | +0.41 | NS |
| Uric Acid | -5.10 | -3.30 | S | +5.09 | +0.72 | NS |
| Blood Urea Nitrogen | +0.22 | +0.16 | NS | +0.87 | +1.20 | NS |

.05 = Significant Level; S = Significant; NS = Not Significant; N = 15 in Each Medical Classification in Each Group.

TABLE XV (CONTINUED)

| Variable | Group I Mean Change | T | P | Group II Mean Change | T | P |
|---|---|---|---|---|---|---|
| | | | Obese Patients | | | |
| Fasting Blood Sugar | -2.00 | -0.64 | NS | -10.25 | -1.48 | NS |
| Peak Blood Sugar | -- | -- | NS | -88.00 | -- | NS |
| Low Blood Sugar | -- | -- | NS | -9.00 | -- | NS |
| Serum Cholesterol | -30.71 | -4.97 | S | -12.23 | -1.08 | NS |
| Serum Triglycerides | -91.18 | -3.01 | S | +29.50 | +0.83 | NS |
| Uric Acid | -0.53 | -0.30 | NS | -5.60 | -1.51 | NS |
| Blood Urea Nitrogen | -1.26 | -0.89 | NS | +0.50 | +0.57 | NS |
| | | | Hypoglycemic Patients | | | |
| Fasting Blood Sugar | -9.00 | -1.31 | NS | +10.38 | +1.89 | NS |
| Peak Blood Sugar | -104.00 | -- | NS | -- | -- | NS |
| Low Blood Sugar | -1.00 | -- | NS | -- | -- | NS |
| Serum Cholesterol | -26.67 | -2.36 | NS | -4.43 | -0.15 | NS |
| Serum Triglycerides | -65.75 | -3.37 | S | -16.25 | -0.44 | NS |
| Uric Acid | -3.33 | -1.05 | NS | -2.00 | -0.29 | NS |
| Blood Urea Nitrogen | -1.26 | -0.52 | NS | -1.67 | -0.93 | NS |

.05 = Significant Level; S = Significant; NS = Not Significant;
N = 15 in Each Medical Classification in Each Group.

changes in the fasting blood sugar for both groups of patients were not statistically significant although they were lower in both groups of patients at the second time period than at the first. Low blood sugars were available for only two patients in each group at the second time period so the mean change in each of these blood sugar levels appears misleading. However, for those patients in Group I the mean changes from the first to second time period in the serum levels of cholesterol and triglycerides were statistically significant. These changes were not statistically significant for the patients in Group II.

The uric acid level and blood urea nitrogen mean changes were not statistically significant in the diabetic patients in Group I. However, this may or may not be significant in the control of diabetes. Neither the uric acid level changes nor the blood urea nitrogen changes for Group II were statistically significant.

Statistically significant changes from the first to the second time period for the hypertensive patients in Group I included serum cholesterol level, serum triglyceride level and uric acid level. The fasting blood sugar level change was not statistically significant for patients in either group. None of the 15 hypertensive patients in Group I had peak or low blood sugars available because they had not taken a second glucose tolerance test. Only two of the patients in Group II had peak and low blood sugar levels available and they were not statistically significant changes. The change in the blood urea nitrogen was not statistically significant for either group. The changes in serum cholesterol level, serum triglyceride level and uric acid level were not statistically significant for Group II.

The obese patients in Group I had statistically significant changes from the first to second time period in the serum cholesterol level and serum triglyceride level. Neither of these changes were statistically significant for the patients in Group II. None of the 15 patients in Group I had a second glucose tolerance test and so peak and low blood sugar levels were not available. Only one of the patients in Group II had undergone a second glucose tolerance test and the change was not statistically significant. Uric acid level and blood urea nitrogen changes were not statistically significant for either group.

The hypoglycemic patients in Group I had a statistically significant change from the first to second time period in the serum triglyceride level although the patients in Group II did not. The change in fasting blood sugar was not statistically significant for either group. However, this can be explained since the fasting blood sugar is usually within normal limits with a hypoglycemic patient. Only one patient in Group I had a second glucose tolerance test and so the change in the peak and low blood sugars were not statistically significant. Since 11 of the 15 hypoglycemic patients were feeling good or excellent after completion of the sessions a second glucose tolerance test was not indicated. Four of the hypoglycemic patients in Group II had a second glucose tolerance test but the changes in peak and low blood sugars were not statistically significant. The changes in serum cholesterol level, uric acid level and blood urea nitrogen were not statistically significant for either group of patients.

## Weight Changes

The mean weight changes obtained by t-test values of the patients in both groups from the first to the second time period are shown in Table XVI. The minus signs represent a decrease in weight and the plus signs represent an increase in weight.

TABLE XVI

T-TEST VALUES REFLECTING THE MEAN WEIGHT CHANGE IN ALL PATIENTS

| | Group I | | Group II | | | |
|---|---|---|---|---|---|---|
| Patients | Number | Mean | Number | Mean | T | P |
| Diabetic | 15 | -12.07 | 15 | +1.07 | -7.52 | S |
| Hypertensive | 15 | -13.73 | 15 | +2.00 | -11.87 | S |
| Obese | 15 | -15.00 | 15 | +2.53 | -10.15 | S |
| Hypoglycemic | 15 | -8.66 | 15 | +6.54 | -4.86 | S |

.05 = Significant Level; S = Significant; NS = Not Significant

The diabetic patients in Group I had a mean weight loss of 12.07 pounds. This was statistically significant at the .0001 level. The weight losses ranged from a loss of three pounds to a loss of 26 pounds. The diabetic patients in Group II had a mean weight gain of 1.07 pounds which was not statistically significant. The weight changes ranged from a 13-pound loss to a 17-pound gain.

The hypertensive patients in Group I had a mean weight loss of 13.73 pounds which was significant at the .0001 level. The weight changes ranged from an eight-pound loss to a 25-pound loss. The mean weight change for the hypertensive patients in Group II was a 2.00-pound gain

which was not statistically significant. The weight changes ranged from a 13-pound loss to a 23-pound gain.

The obese patients in Group I had a mean weight loss of 15 pounds which was statistically significant at the .0001 level. The weight changes ranged from an eight-pound loss to a 26-pound loss. The mean weight change in the obese patients in Group II was a 2.53-pound gain. The weight changes ranged from a 13-pound loss to a 23-pound gain.

The hypoglycemic patients in Group I had a mean weight change of an 8.66-pound loss which was statistically significant at the .0003 level. The hypoglycemic patients in Group II had a mean weight change of a 6.54-pound gain which was not statistically significant. The weight changes ranged from a four-pound loss to a 50-pound gain. Excluding the one patient who gained 50 pounds the weight changes ranged from a four-pound loss to a 15-pound gain.

## Blood Pressure Changes

The comparison of the systolic blood pressure change for the second time period for all patients according to specific medical problems is is shown in Figure 2. The mean systolic change in the diabetic patients in Group I was a decrease of 15.14 mm. Hg which was statistically significant at the .0004 level. The changes ranged from -2.00 mm. Hg to -40.00 mm. Hg. The mean decrease in systolic blood pressure for the diabetic patients in Group II was a decrease of 8.00 mm. Hg which was not statistically significant. The changes ranged from a decrease of 50.00 mm. Hg to an increase of 19.00 mm. Hg. One reason for the difference in the mean change of the two groups was that the mean weight changes of the diabetic patients in Group I was a 12.07-pound loss and the mean weight

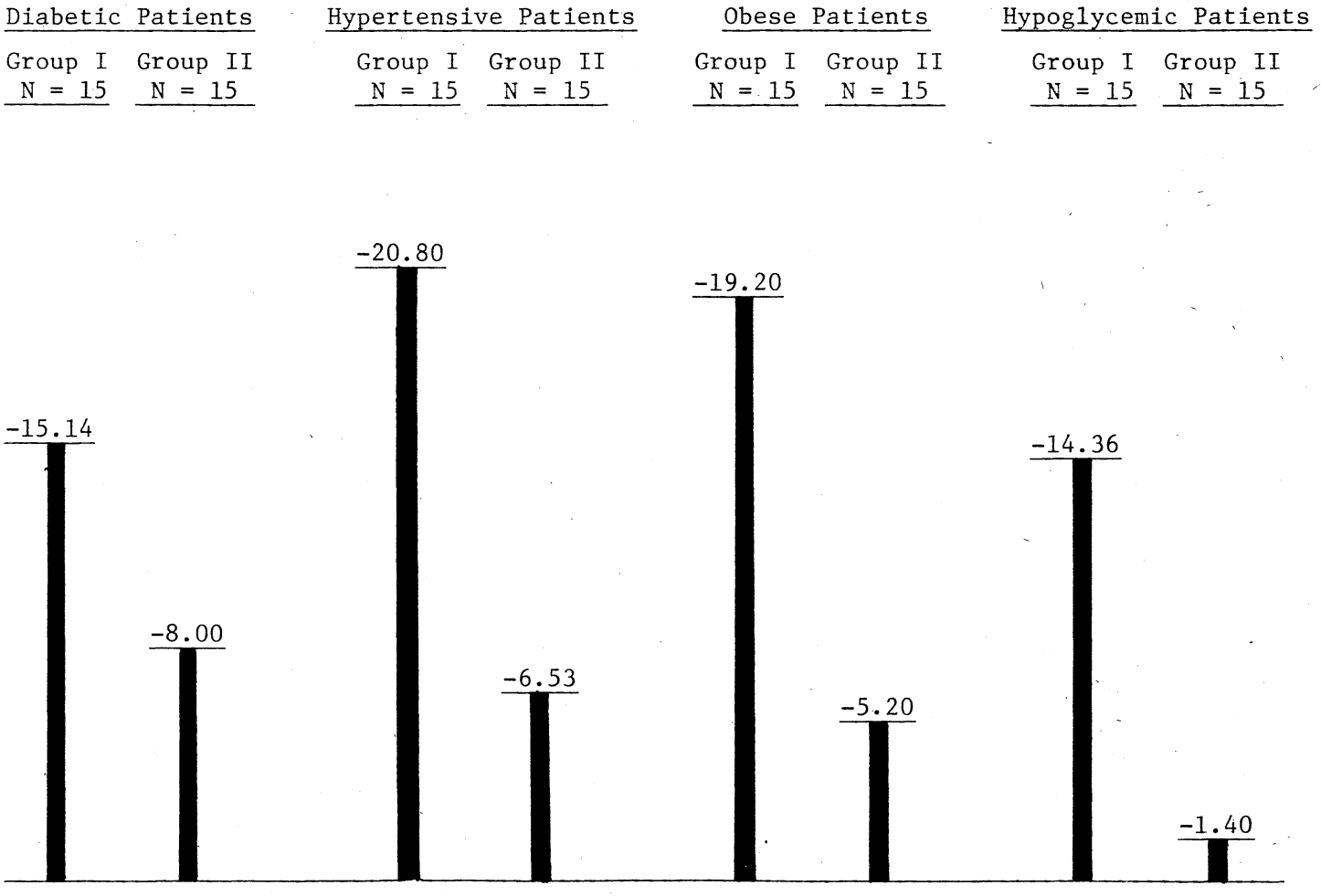


Figure 2. Comparison of the Mean Systolic Blood Pressure Change for All Patients at the Second Time Period

change of those in Group II was a 1.07-pound gain. A decrease in weight usually results in a decrease in blood pressure.

The mean systolic change in the hypertensive patients in Group I was -20.80 mm. Hg which was significant at the .0001 level. The changes ranged from a decrease of 3.00 mm. Hg to a decrease of 45.00 mm. Hg. The mean change of systolic pressure in Group II was -6.53 mm. Hg. The changes ranged from a decrease of 50.00 mm. Hg to an increase of 24.00 mm. Hg. Twelve of the 15 patients in Group II were using medication to control blood pressure. One explanation for the lack of statistical significance among the patients in Group II could be that some of the patients had been on medication for hypertension for some time and a major decrease in blood pressure had occurred before the patient entered this study after having been given diet recommendations by the physician. The mean weight change among the hypertensive patients in Group I was a 13.73-pound loss as compared to a 2.00-pound gain among the patients in Group II. The mean weight loss in Group I as compared to the mean weight gain in Group II could account for the greater decrease in systolic pressure.

The mean change in systolic pressure from the first to second time period for the obese patients in Group I was a decrease of 19.20 mm. Hg which was statistically significant at the .0001 level. The mean change in systolic pressure from the first to the second time period for the obese patients in Group II was a decrease of 5.20 mm. Hg which was not statistically significant. The changes ranged from a decrease of 50.00 mm. Hg to an increase of 24.00 mm. Hg. As with the hypertensive patients, part of the difference in the changes in these two groups was related to the difference in weight change. The mean weight change

of the obese patients in Group I was a loss of 15.00 pounds while the mean weight change for the obese patients in Group II was a gain of 2.53 pounds.

The mean systolic change in the hypoglycemic patients in Group I was a decrease of 14.36 mm. Hg which was statistically significant at the .0217 level. The changes ranged from a decrease of 35.00 mm. Hg to an increase of 18.00 mm. Hg. The mean change in the systolic pressure of the hypoglycemic patients in Group II was -1.40 mm. Hg which was not statistically significant. The changes ranged from a decrease of 14.00 mm. Hg to an increase of 22.00 mm. Hg.

The comparison of the mean change in the diastolic pressure for all patients at the second time period is shown in Figure 3. The diabetic patients in Group I had a mean decrease of 2.14 mm. Hg in diastolic blood pressure. This change was not statistically significant. The changes in diastolic pressure ranged from a decrease of 28.00 mm. Hg to an increase of 17.00 mm. Hg. The mean change in the diastolic pressure for the diabetic patients in Group II was a decrease of 5.40 mm. Hg. This was not a statistically significant change. The changes ranged from a decrease of 28.00 mm. Hg to an increase of 9.00 mm. Hg.

The hypertensive patients in Group I had a mean diastolic change of -5.07 which was not statistically significant. The changes ranged from a decrease of 28.00 mm. Hg to an increase of 17.00 mm. Hg. The hypertensive patients in Group II had a mean diastolic change of -0.67 mm. Hg which was not statistically significant. The changes ranged from a decrease of 22.00 mm. Hg to an increase of 12.00 mm. Hg. Once again, 12 of the 15 hypertensive patients were using medication to control blood pressure. However, some of the patients had been on medication for

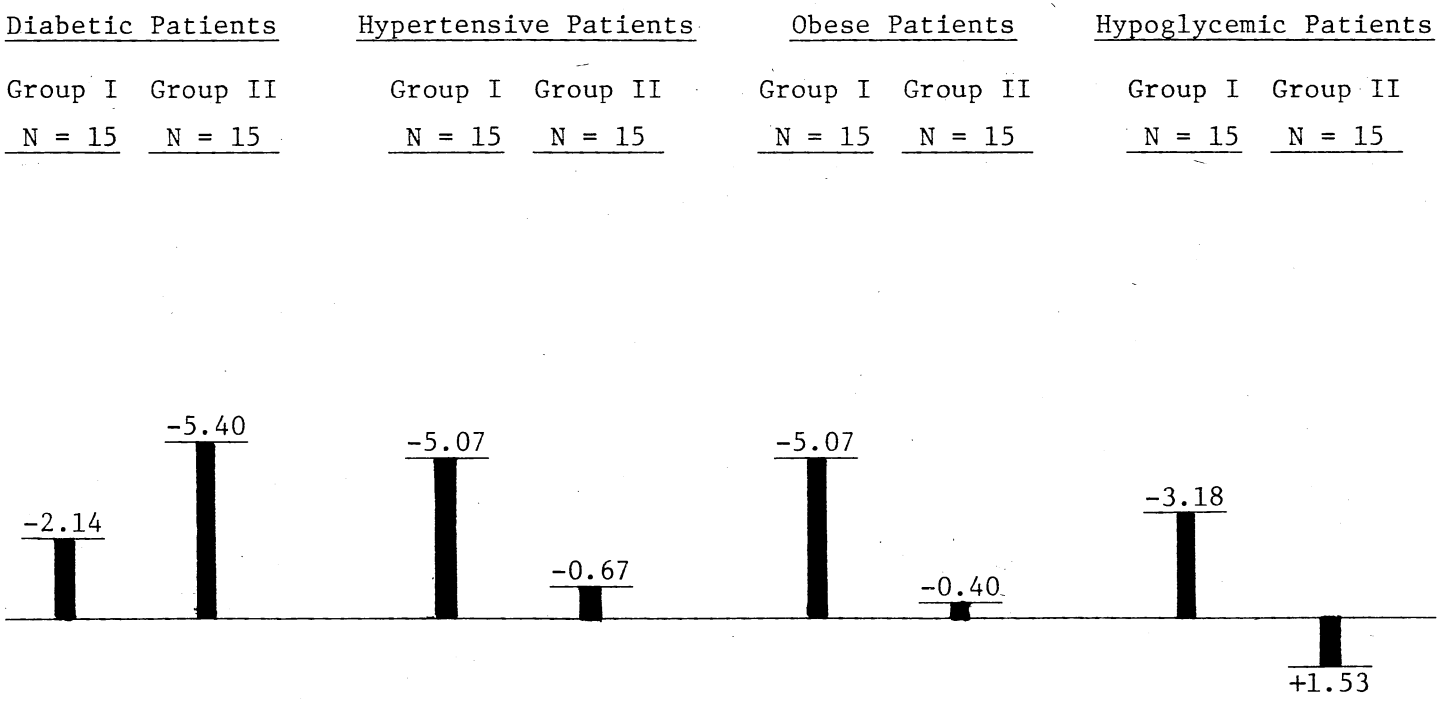


Figure 3. Comparison of the Mean Diastolic Blood Pressure Change for all Patients at the Second Time Period

some time before they were included in this study. Thus, the diastolic pressure had probably already decreased from the time the original diagnosis of hypertension had been made. Also, the mean weight change among the hypertensive patients in Group I was a decrease of 13.73 pounds while the patients in Group II had a mean increase of 2.00 pounds. This could effect the lack of a statistically significant change among the patients in Group II.

The mean change in diastolic blood pressure for the obese patients in Group I was a decrease of 5.07 which was not statistically significant. The changes ranged from a 33.00 mm. Hg decrease to a 17.00 mm. Hg increase. The patients in Group II had a mean diastolic change of 0.40 which was not statistically significant. These changes ranged from a decrease of 28.00 mm. Hg to an increase of 18.00 mm. Hg.

The hypoglycemic patients in Group I had a mean diastolic blood pressure decrease of 3.18 mm. Hg. This change was not statistically significant. The changes ranged from an 18.00 mm. Hg decrease to an 18.00 mm. Hg increase. The hypoglycemic patients in Group II had a mean diastolic blood pressure change of 1.53 mm. Hg increase. The changes ranged from a 12.00 mm. Hg increase to a decrease of 18.00 mm. Hg. This change was not statistically significant.

# CHAPTER V

## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to determine the effectiveness of a nutrition education program among patients of a practicing physician. The patients had several clinical conditions including diabetes, hypertension, obesity and hypoglycemia. The nutrition program was developed by the physician and the researcher. The main purpose of the program was to offer patients specific dietary instruction according to the physician's recommended diet order.

The dietary instruction was presented in four planned nutrition sessions. These sessions were conducted by the researcher in an office within the physician's suite of offices. The first session was one hour in duration and included only one patient and the researcher. Recommendations were made regarding the diet prescribed by the physician. During the first session the patient answered a questionnaire from which partial data for the study was collected.

The second session focused on nutritious snacks, vitamins and composition of food. During the third session food preparation as related to each patient's diet was discussed. Following a diet when eating away from home and a wide variety of breakfasts were also discussed. Session four consisted of a discussion on meal planning as related to each patient's special diet and ways to cut the food budget. Patients were given time and opportunity for questions in all sessions.

Data for the study was collected at two time periods. The first time period for Group I was when each patient attended the first nutrition session and the second time period was three to six months later. The first time period for Group II was when diet recommendations were made by the physician after having diagnosed the patient as having one of the conditions studied. The second time period for Group II was three to six months later.

There were a total of 69 patients in this study. Thirty-four of the patients attended the nutrition sessions (Group I) and 35 of the patients were the control group and did not attend the sessions (Group II). The medical conditions that were studied included diabetes, hypertension, obesity and hypoglycemia. There were 15 patients with each of these medical conditions in Group I and in Group II. However, some of the patients had more than one of the medical conditions and were included in more than one medical classification. None of the patients in Group I were using any medication to control the medical condition being studied. Any changes in physical symptoms of the patients, nutrient consumption, blood pressure, weight or blood chemistries were by diet alone. However, eight of the diabetic patients in Group II were using medication to control the blood sugar level and 12 of the hypertensive patients were using medication to lower blood pressure. It was assumed that the changes in these patients from the first time period until the second time period resulted from dietary treatment and medication.

The effectiveness of this program was determined by comparing data collected from the two groups of patients. The following data was collected from the patients in Group I: a questionnaire answered at both time periods, a 24-hour recall (included in the questionnaire) at both

time periods; and information collected from each patient's chart including weight, blood pressure, fasting blood sugar, peak blood sugar, low blood sugar, serum cholesterol level, serum triglyceride level, uric acid level and blood urea nitrogen at both time periods.

The following data was collected for those patients in Group II: the same questionnaire that was used with the first group of patients answered at the second time period; a 24-hour recall (included in the questionnaire); and information collected from each patient's chart at both time periods which included weight, blood pressure, fasting blood sugar, peak blood sugar, low blood sugar, serum cholesterol level, serum triglyceride level, uric acid level and the blood urea nitrogen level.

All of the patients in both groups were given basic diet instruction and presented with a list of the approximate carbohydrate content of certain foods (and how to use these and other foods in the diet) by the physician and/or nurse. However, the patients in Group II did not attend the nutrition sessions.

Specifically, the effectiveness of the program was determined by four measures: the responses to the questionnaires regarding the physical symptoms of the patients, the 24-hour recall (included in the questionnaire), the patient's nutritional knowledge and data collected from each patient's chart. The findings will be divided according to these methods of collecting data.

## Summary of Findings

In general, the patients in Group I felt better at the second time period than those patients in Group II. The patients were asked to

describe how they generally felt in terms of poor, fair, good or excellent. At the beginning of the sessions 74 per cent of the patients felt poor or fair and 26 per cent felt good. At the second time period none of the patients felt poor, 18 per cent felt fair and 82 per cent felt good or excellent. Eighteen per cent of the 35 patients in Group II felt poor at the second time period, 40 per cent felt fair, 40 per cent felt good and two per cent felt excellent. In general, there were more statistically significant changes in responses to the physical symptoms of the patients in Group I than reflected in the data collected from the patients in Group II.

There was a statistically significant difference in the nutritional knowledge of those patients in Group I at the second time period as compared to those in Group II. This knowledge included listing the basic four food groups, selecting five or more good sources of vitamin A and five or more good sources of vitamin C.

In general there was a difference in the selection of snacks at the second time period for both groups. For the patients in Group I the following data was collected at the second time period: nine per cent still consumed candy or sugared beverages; three per cent consumed cake, pie or cookies; six per cent consumed chips, pretzels or popcorn; six per cent consumed ice cream, custard or malts; 82 per cent consumed cheese, meats or nuts; 41 per cent consumed crackers, bread or cereal; and 83 per cent of the patients consumed fruits or vegetables. Most patients consumed several types of snacks. The larger percentages of snacks consumed were selected from the more nutritious foods.

Fifty per cent of those patients in Group II still consumed candy or sugared beverages at the second time period; 30 per cent consumed

cake, pie or cookies; 15 per cent consumed chips, pretzels or popcorn; 23 per cent consumed ice cream, custard or malts; 50 per cent consumed cheese, meat or nuts; 43 per cent consumed crackers, bread or cereal; and 37 per cent consumed fruits or vegetables.

There were significant changes in the improvement of intake of the nutrients calcium, iron, riboflavin and ascorbic acid for the patients in Group I. There was no statistical significance in meeting the Recommended Dietary Allowances of vitamin A because the same number of people met the Recommended Dietary Allowance for vitamin A at both time periods. More than twice the number of subjects in Group I met the Recommended Dietary Allowances for all the nutrients studied except vitamin A at the second time period than the first time period. This data shows a definite improvement in nutrient consumption at the second time period for Group I.

The mean changes in weight, systolic blood pressure and triglyceride level were statistically significant for all the patients in Group I from the first to the second time period. The mean change in serum cholesterol level was statistically significant for all patients in Group I except for the hypoglycemic patients. The decrease in uric acid level was not statistically significant for any patients in Group I except the hypertensive patients. The blood urea nitrogen changes were not statistically significant for any patients in Group I.

None of the blood chemistry mean changes were statistically significant for the patients in Group II. This certainly is not to say that no changes occurred, but simply that they were not large enough to be statistically significant.

## Conclusions

The following conclusions of this study are presented from the analysis of questionnaires, 24-hour recalls, laboratory data and other physiological data collected from medical charts.

1. Patients participating in a nutrition education program in conjunction with a physician are better able to follow diet recommendations because of detailed explanation and a planned nutrition education program. Improvement in the patient's general health was greater for having participated in the nutrition education program.
2. Patients participating in a nutrition education program in conjunction with a physician have a better and broader knowledge of nutrition than patients not participating in the program.
3. The number of patients improving the intakes of certain nutrients as compared to the Recommended Dietary Allowances was greater for those who participated in a nutrition program than for those who did not participate in the program.
4. Improvements in certain laboratory data were higher among patients following diet recommendations.
5. Physiological changes that are nutritionally linked (such as weight and blood pressure) are more likely to change favorably if patients follow diet recommendations strictly.

## Recommendations

1. Ideally a larger number of patients could be included in a future study of this type.
2. Studying more than four medical conditions would be helpful in broadening the scope of the study.
3. If patients could be studied for a longer period of time (preferably 10 to 15 years) more information pertaining to preventive nutrition would be available.
4. It would be helpful in future studies for the time periods for collecting data to be more precise for all patients. For example, all data could be collected every six months or another specific length of time.
5. The use of other types of evaluations or testing such as lipid profiles, thyroid tests or urine analysis could be used to obtain more objective conclusions.
6. It would be helpful in future studies if none of the patients in either group studied were using medication to control the medical conditions. However, it would be difficult to find a large number of patients in all groups studied not using medication since many conditions (such as hypertension) indicate the immediate need for medication.

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# APPENDIX A

## FOOD LIST GIVEN TO ALL PATIENTS

# FOOD LIST GIVEN TO ALL PATIENTS

## Vegetables

### 3% Vegetables

Asparagus
Beet greens
Broccoli
Cabbage
Cauliflower
Celery
Chinese Cabbage
Cucumber
Endive
Eggplant
Green pepper
Lettuce
Mushrooms
Mustard greens
Okra
Radishes
Sauerkraut
Spinach
Tomato
Turnip greens

### 6% Vegetables

Beets
Brussel sprouts
Carrots
Collards
Green beans
Kale
Kohlrabi
Onion
Pumpkin
Red pepper
Rutabaga
Squash
Turnips

### 15% Vegetables

Artichokes
Green peas
Parsnips

### 20% Vegetables

Corn
Dried beans
Dried peas
Lima beans
White potato

### 25% Vegetables

Sweet potatoes
Yams

## Fruits

### 5% Fruits

Cantaloupe
Honeydew
Rhubarb
Strawberries
Watermelon

### 10% Fruits

Apricots
Blackberries
Cranberries
Currants
Gooseberries
Grapefruit
Grapefruit juice
Lemons
Limes
Oranges
Orange juice
Papaya
Peaches
Plums
Tangerines

### 15% Fruits

Apples
Blueberries
Cherries
Grapes
Guava
Huckleberries
Kumquats
Loganberries
Mulberries
Pears
Pineapple
Pineapple juice
Raspberries

### 20% Fruits

Bananas
Figs (fresh)
Grape juice
Prunes (fresh)

# APPENDIX B

## QUESTIONNAIRE - PRE AND POST TREATMENTS

Name_____

PRE- and POST-TEST

Date_____

We would appreciate your cooperation in answering the following questions pertaining to your general health and present nutrition. This is not a test but merely a method to determine your nutritional health. Thank you for your cooperation.

1. How do you generally feel most of the time?

_____Poor _____Fair _____Good _____Excellent

2. How often do you feel nervous?

_____Most of the time
_____Often, but not most of the time
_____A fair amount of the time
_____Very little of the time
_____Never

3. How often do you feel irritable?

_____Most of the time
_____Often, but not most of the time
_____A fair amount of the time
_____Very little of the time
_____Never

4. How often do you feel sluggish (slow to respond)?

_____Most of the time
_____Often, but not most of the time
_____A fair amount of the time
_____Very little of the time
_____Never

5. How often are you depressed?

_____Most of the time
_____Often, but not most of the time
_____A fair amount of the time
_____Very little of the time
_____Never

6. How often do you have headaches?

_____Most of the time
_____Often, but not most of the time
_____A fair amount of the time
_____Very little of the time
_____Never

7. How often do you crave sweets?

_____Most of the time
_____Often, but not most of the time
_____A fair amount of the time
_____Very little of the time
_____Never

8. How often do you feel fatigued?

_____Most of the time
_____Often, but not most of the time
_____A fair amount of the time
_____Very little of the time
_____Never

9. How often do you feel weak?

_____Most of the time
_____Often, but not most of the time
_____A fair amount of the time
_____Very little of the time
_____Never

10. How often do you feel dizzy?

_____Most of the time
_____Often, but not most of the time
_____A fair amount of the time
_____Very little of the time
_____Never

11. Which of the following stimuli cause you to eat?

_____Nervousness _____Boredom _____Hunger _____Anger

_____Frustration _____Lonesomeness _____Happiness

12. Do you eat while:

watching television? __Usually __Sometimes __Occasionally __Never

talking on the telephone? __Usually __Sometimes __Occasionally __Never

reading the newspaper or a book? __Usually __Sometimes __Occasionally __Never

13. List everything that you eat during an average day for each of these time spans.

Rising - 10:00 a.m._____

10:00 - 2:00 p.m._____

2:00 - 5:00 p.m._____

5:00 - 8:00 p.m._____

8:00 - Bedtime _____

14. List everything that you have eaten today.

_____

_____

_____

_____

15. List your favorite and most frequent snacks.

_____

_____

16. What sugared beverages do you consume and how often?

_____

_____

17. Are most of the meats that you eat:

_Broiled? __Fried with added fat? __Fried without fat? __Baked?

18. How often do you consume each of the following?

Beer ___Daily ___2-4 times a week ___1 time a week

___1 time a month ___Never

Wine ___Daily ___2-4 times a week ___1 time a week

___1 time a month ___Never

Liquor ___Daily ___2-4 times a week ___ 1 time a week

___1 time a month ___Never

19. How much coffee (not decaf) do you drink daily?

____None ____1-2 cups ____2-4 cups ____4-6 cups ____6-8 cups

20. Which of the following do you add to your coffee (regular or decaf)?

____Cream ____Sugar ____Milk ____Non-dairy creamer ____Nothing

21. How much tea do you drink daily?

__None __1-2 servings __2-4 servings __4-6 servings __6-8 servings

22. Do you add sugar to your tea? ____Yes ____No

23. Do you most frequently use:

_____Butter? _____Corn oil margarine?

_____Other vegetable oil margarine? _____Not sure

24. Do you usually eat desserts? ____Yes ____No

25. When you do eat desserts which of the following would you choose?

____Cakes ____Pies ____Fruit ____Ice cream ____Jello ___Custard

26. How often do you consume each of the following?

Cakes ____Daily ____2-4 times a week ____1 time a week

____1 time a month ____Never

Pies ____Daily ____2-4 times a week ____1 time a week

____1 time a month ____Never

Candy ____Daily ____2-4 times a week ____1 time a week

____1 time a month ____Never

27. Do you usually eat breakfast? ____Yes ____No

If yes, what do you usually eat?

_____

_____

28. How many eggs do you consume weekly (including those used in cooking)?

____None ____0-3 ____3-5 ____5-7 ____7-10 ____More than 10

29. Do you usually leave food on your plate after you have finished eating? ____Yes ____No

30. List the 4 Basic Food Groups if you know them.

1._____ 3._____

2._____ 4._____

Beside each group put the number of recommended servings if you know them.

31. Which of the following do you feel are good sources of Vitamin C?

___Potatoes ___Cabbage ___Oranges ___Tomatoes ___Grapefruit

___Green pepper ___Broccoli ___Cantaloupe ___Sweet potatoes

32. Which of the following do you feel are good sources of Vitamin A?

___Carrots ___Liver ___Egg ___Pumpkin ___Cheese ___Apricots

___Margarine ___Spinach ___Sweet potatoes ___Peaches ___Milk

33. How often do you eat out?

__Daily __2-4 times a week __1 time a week __1 time a month __Never

34. Which of the following types of places are you most likely to eat?

___Restaurants ___Cafeterias ___Dinner Clubs ___Fast Food Places

35. Which of the following descriptions fits you the best?

___Early to rise ___Late to rise ___Early to bed ___Late to bed

36. Basically, do you believe that you have good eating habits?

___Yes ___No

37. What foods do you consider harmful to your health?

_____

_____

38. How many sick days to you have a month?

____None ____1-2 ____2-4 ____4-6 ____More than 6

39. Do you smoke? ____Yes ____No

40. If you have already participated in the 4-week nutrition program offered in this office would you please comment on the effectiveness of the program and if you feel the program was worthwhile to you? Are there any changes that you feel should be made in the program? Thank you for your cooperation. If we can be of any further assistance concerning your nutritional health please do not hesitate to let us know.

# APPENDIX C

## CONTENT OF BASIC NUTRITION SESSIONS

CONTENT OF BASIC NUTRITION SESSIONS

| Content | Session I | Session II | Session III | Session IV |
|---|---|---|---|---|
| Information Presented | The diet and its relationship to the medical condition<br>Menu planning according to specific diet recommendations<br>Nutrition labeling and its use in diets | Nutritious snacks<br>Vitamins and Minerals<br>Food composition | Methods of food preparation for special diets<br>Following a special diet away from home<br>Variety in breakfasts | Meal planning for the special diet<br>Food budget |
| Printed Material Provided to Patients | Definitions of terminology<br>Basic good eating habits<br>Nutrition labeling<br>Sample menus<br>A food record | Snacks to enjoy<br>Treats to try<br>Beverage ideas | Recipes to try<br>Using spices in cooking<br>Breakfast ideas<br>Food selections when eating away from home | How to plan a good meal<br>Tips for buying groceries |
| Visual Aids | Food models to represent portion sizes<br>Food label flashcards | Food composition cards<br>Snack idea flashcards | Restaurant menu sample<br>Flashcards of food selection in restaurant meals | Display of food models on plates<br>Similar food products with varied prices |

# APPENDIX D

# FOOD RECORD

Name _____

Date _____

FOOD RECORD

| Foods Eaten | Amount | How did you feel? | Exchanges | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Milk | Vegetable | Fruit | Bread | Meat | Fat |
| **Breakfast** | | | | | | | | |
| | | | | | | | | |
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| | | | | | | | | |
| **Snack** | | | | | | | | |
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| **Lunch** | | | | | | | | |
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| **Snack** | | | | | | | | |
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| **Dinner** | | | | | | | | |
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| **Snack** | | | | | | | | |
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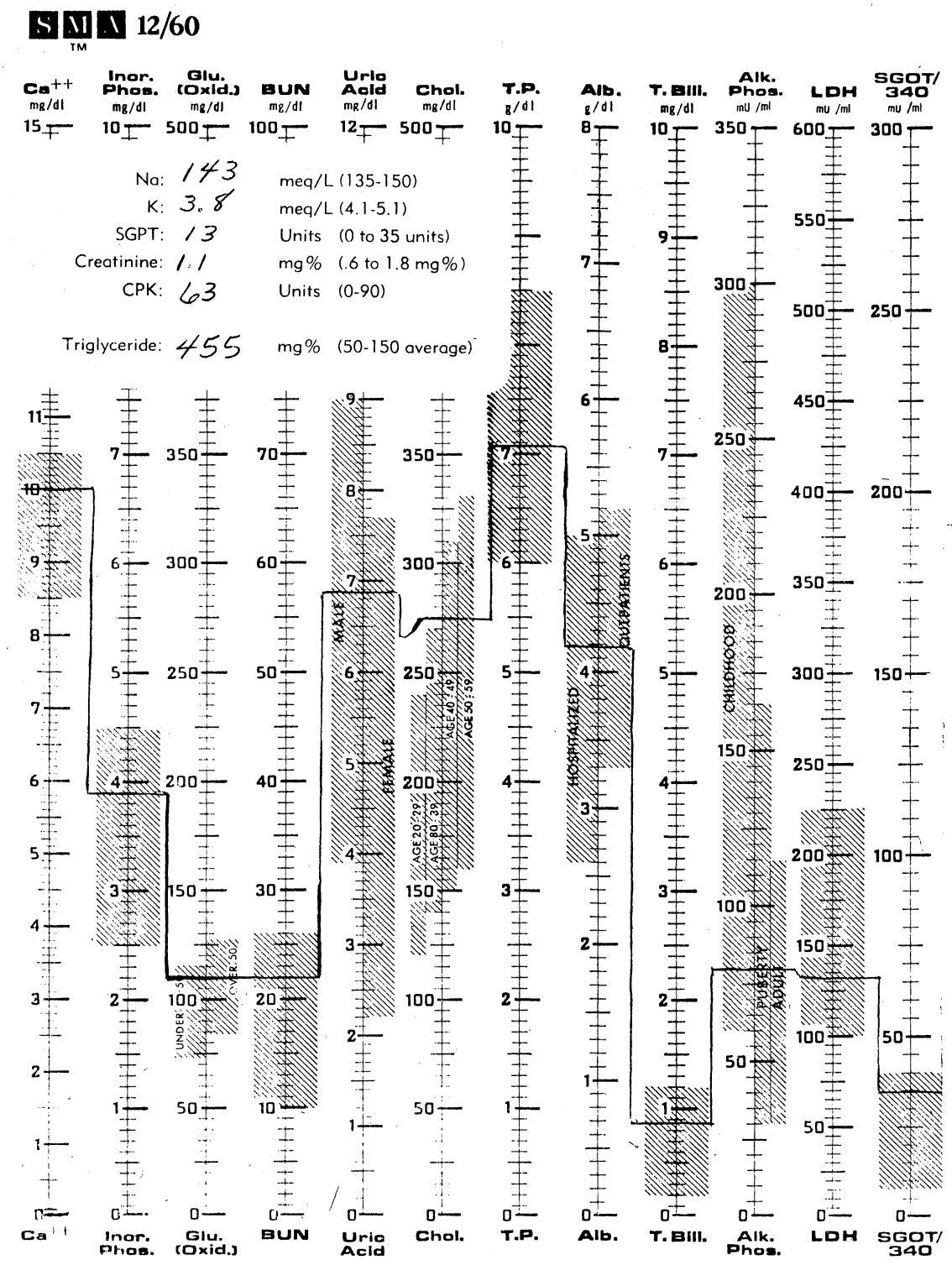
# APPENDIX E

# SAMPLE LABORATORY REPORT




Patient's Name _____

No. _____ Rm. _____ Date _____

VITA 2

Rebecca Lynn McCully

Candidate for the Degree of

Master of Science

Thesis: THE EVALUATION OF THE EFFECTIVENESS OF A NUTRITION EDUCATION PROGRAM IN CONJUNCTION WITH A PHYSICIAN INVOLVING DIABETIC, HYPERTENSIVE, OBESE AND HYPOGLYCEMIC PATIENTS

Major Field: Food, Nutrition and Institution Administration

Biographical:

Personal Data: Born in Amarillo, Texas, February 28, 1954, the daughter of Bill G. and Betty L. McCully.

Education: Graduated from Northwest Classen High School, Oklahoma City, Oklahoma, May, 1972; received a Bachelor of Science in Home Economics degree at Oklahoma State University, Stillwater, May, 1976; completed requirements for a Master of Science degree with a major in Food, Nutrition and Institution Administration from Oklahoma State University, December, 1977.

Professional Experience: Dietetic Technician, St. Anthony Hospital, Oklahoma City, June, 1976 to September, 1976; Nutrition Consultant with Dr. Harold Masters, October, 1976 to present.

Organization Membership: Omicron Nu Honor Society