CHARACTERISTICS, ATTITUDES, AND DIETARY KNOWLEDGE OF PARTICIPANTS IN AN URBAN DIABETES SCREENING PROGRAM

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SCREENING PROGRAM

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PROBLEM DEFINITION

Introduction

Diabetes mellitus is a world wide relatively common health problem. Different authors use different statistics to express the scope of the problem.

> The National Commission on Diabetes has recently reported that as many as ten million Americans have diabetes, known and unknown. Between 1965 and 1973 the incidence increased by over 50 percent, and diabetes now affects five percent of the population of the United States. At the current rate of increase--six percent per year--the number of persons with diabetes will have doubled by the 1990s (1, p. 9).

As a cause of death, diabetes has risen from 27th place in 1900 to 5th place in 1970. It is a factor in approximately five percent of all hospital admissions (2). Robinson (3) states that about 35,000 deaths from diabetes are reported annually in the United States, placing the disease eighth as a cause of death. Robinson describes diabetes as a major socio-economic ill that is costing more than two billion dollars annually in terms of loss of earnings, costs of hospitalization, physicians' fees, medication, and rehabilitation.

Significance

Diabetes is controllable through diet, medication, and exercise. According to Biermann and Toohey (1), the more knowledge the diabetic has, the more successfully will he or she be able to find the best way

to lead an active, healthy, and rewarding life. Consequently then, the diabetic should be assisted to broaden his or her knowledge base by any and all means.

Preventive medicine in the form of preventive health education is beginning to be stressed in modern medicine. According to Brothers (4), the prevention and control of diabetes is the beginning of a forthcoming new attitude. The preventive approach is taking that segment of the population who are at a greater risk of developing diabetes and exposing that group to educational means which may lead to a lowered risk. West (5, 6, 7, 8) reported that diabetes could possibly be prevented by control of caloric intake and subsequent obesity.

In a study by Etzwiler and Sines (9), it was found that many children and their parents lacked knowledge of the fundamental principles of diabetes. According to Etzwiler:

> Before a juvenile diabetic can be expected to assume primary responsibility for his disease, he must be acquainted with the fundamental concepts of the condition. A child's knowledge of diabetes and his acceptance of responsibility for its management go hand-in-hand, and before urging self-care the physician should be certain the child understands the fundamentals of the disease (p. 307).

Jernigan (10) stated that dietary control is sometimes not followed because perhaps it is taught to individuals with diabetes inadequately. She believes in the importance of individual dietary management. Generally, one-fourth of the diabetic population are not given special diets, and one-fourth who have special diets often do not follow them (11). It has also been estimated that only three-fourths of the diabetics on special diets have been instructed on the application of their diet (12).

According to Etzwiler (13), optimum control offers an increased life expectancy with a minimum of medical complications. To achieve

this, the patient must have a thorough comprehension of the disease and be willing to cooperate closely with the medical health care professionals. The desired outcome is self-care preceded by knowledge of his or her disease and encouragement to assume increasing responsibility.

Many diabetics lack fundamental knowledge of the disease, such as urine testing, how to manage the diet, comprehension of dietary items, and insulin administration. Consequently, further research is necessary to identify the extent to which diabetics lack basic knowledge and to make recommendations about improving their knowledge.

Purpose

The purpose of this study was to assess the characteristics, attitudes, and dietary knowledge of persons with diabetes mellitus in an urban diabetes screening program. The data collected will hopefully add to a body of knowledge which can be used by nutritionists in preparing appropriate educational materials and nutrition education curricula for diabetes screening programs.

Objectives

The specific objectives of the study were:

1. To assess the characteristics of persons with diabetes mellitus in an urban screening program. Selected demographic variables were age, sex, education, diabetes education experiences, occupation, presence of diabetes in other family members, the blood glucose level at the time of screening, the length of time the individual has had diabetes, and whether or not the individual required insulin, oral hypoglycemic agents (OHA) or controlled the disease by diet only.

2. To assess the attitudes of persons with diabetes mellitus in an urban screening program towards diabetes mellitus and its inherent dietary restrictions. The attitudes were measured by responses to an opinion questionnaire.

3. To assess the dietary knowledge of persons with diabetes mellitus in an urban screening program. Dietary knowledge was obtained from the scores on the dietary knowledge test.

Limitation

This study is limited to the 85 individuals who participated in the diabetes screening program at The American Diabetes Association, Eastern Oklahoma Chapter in Tulsa, Oklahoma, on five consecutive Fridays during late spring and early summer of 1979. The population may not be representative of similar populations in other screening programs; consequently, generalizations which will be made from the study will only apply to the population used.

Definition of Terms

The following terms were identified for this study:

Control by Diet: A state where blood sugar is controlled or stabilized based on optimum nutrition and achieving normal weight. The diabetic diet is based on the Food Exchange list where similar foods are grouped and may be used as tradeoffs in meal planning (3).

Diabetes Mellitus or Diabetes: A genetic disease of metabolism in which there is a partial or total lack of functioning insulin; it is characterized by the lessened ability or complete inability of the

tissues to utilize carbohydrate. Hyperglycemia, glycosuria, and excessive urination are cardinal findings (3, p. 491).

Diabetes Control: A state in which the normal weight for the individual and blood sugar levels are maintained, where there is little or no sugar in the urine, and where acidosis or reactions to insulin are absent (14).

Diabetes Knowledge: Basic fundamental understanding of diabetes mellitus, urine testing, comprehension of dietary items, and insulin administration (9).

Diabetes Screening Program: A clinic supported by the Eastern Chapter of the American Diabetes Association and affiliated with the Diabetes Education Center of St. Francis Hospital, Tulsa, Oklahoma. Established to identify potential diabetics, monitor blood glucose levels, refer individuals to physicians and to attend diabetes classes.

Oral Hypoglycemic Agents (OHA): Oral compounds useful in the management of maturity onset diabetes which cannot be controlled by diet alone. The drugs stimulate the production or release of insulin. Examples of trade names are: Orinase, Diabinese, Dymelor, or Tolinase (3, p. 495).

Insulin: A hormone secreted by beta cells of the islands of Langerhans of the pancreas; promotes utilization of glucose and lowers blood sugar (3, p. 701).

CHAPTER II

REVIEW OF LITERATURE

Introduction

The National Commission on Diabetes listed diabetes as affecting ten million Americans, with perhaps four million undetected. The number of cases of diabetes appears to be increasing at a rate of six percent per year (15).

The literature reviewed related to factors influencing the occurrence of diabetes, the metabolic effects of diabetes, the principles of nutrition and dietary recommendations for patients with diabetes, differences in management necessitated by insulin dependent versus non-insulin dependent diabetes, dietary considerations during special needs, and diabetes education.

Factors Influencing the Occurrence of Diabetes

Those individuals who are at a greater risk of developing diabetes generally have blood relatives who have had diabetes (3). This phenomenon is particularly true for the maturity-onset diabetic (5, 6, 7, 8). Obesity and excessive calorie consumption increase the incidence of developing diabetes. Obesity could possibly be a situation which uncovers the condition, but not necessarily the cause of the disease (3, 5, 6, 8, 16, 17). Generally glucose tolerance decreases with age, so those individuals over 40 are at a greater risk. Generally babies

weighing nine pounds or more are susceptible to possibly becoming diabetic in later life (3).

The Metabolic Effects of Diabetes

The metabolism of carbohydrates, fats, and proteins are affected by an inadequate supply of insulin. The effects of diabetes on metabolism results in poor utilization of glucose by the adipose and muscle tissue because of decreased transfer through the cell membrane. Disturbances in the utilization of glucose result in decreased synthesis of triglycerides, decreased glucose-6-phosphate production and decreased glycogen storage (2). An excess of sugar in the blood often results from glucose being removed from the blood more slowly. Sugar in the urine results when blood glucose exceeds the renal threshold. With loss of glucose in the urine, water and sodium elimination is increased (3).

With a deficiency of insulin, lipogenesis decreases and lipolysis is increased. The consequences in uncontrolled diabetes are that ketones (acetoacetate, beta-hydroxybutyrate, and acetone) are produced at a greater rate than the tissues can handle resulting in ketonemia. Acetone is excreted by the lungs. Acidosis results from ketones combining with alkalies and the depletion of alkaline reserves. Dehydration leads to circulatory failure, renal failure, and coma (3). There is a competition for intracellular oxidation pathways between glucose and fatty acids. Any excessive oxidation of fatty acids leads to inhibition of glycolysis; thus there are high blood glucose levels (18). The increases in fatty acid mobilization and catabolism results in weight loss while increased cholesterol synthesis results in atherosclerosis and other lipid abnormalities (2).

There is a weakness and wasting of muscle by the decreases in protein synthesis and the accelerated breakdown of protein to amino acids. Because of this breakdown, there are increases in the nitrogen level in the blood which must be excreted (2). There is further subsequent loss of potassium in the urine from the breakdown of protein (3).

Normally the level of glucose in the blood varies within narrow limits. Glucose reaches the liver after absorption from the gut and is synthesized from protein. It is utilized mainly by brain, muscle, and adipose tissue. The level of blood glucose represents a balance between the inflow of glucose into the blood and its uptake by the tissues. Thus, both the absorption of glucose from the gut and its production from protein increase blood glucose (18).

The most obvious action of insulin is to lower blood glucose. Protein and fat metabolism are also affected by insulin. The rapid effects of insulin are increased uptake and metabolism of glucose in muscle and fat tissue. There are decreases in fatty acid release from adipose tissue. A rapid effect is increased glycogen formation in the liver and increased synthesis of protein in muscle tissue. The long term effects of insulin are increased activity of certain enzymes involved in glucose metabolism. There is also depressed activity of enzymes involved in gluconeogenesis (18).

The overall effects of insulin include the production of glycogen and of fat from glucose. In the absence of insulin, glycogen and fat readily break down. Insulin at the cellular level increases the rate of glucose across the membranes of insulin sensitive tissues and inhibits adipose tissue lipase (18).

Dietary Recommendations for Patients With Diabetes

Diabetes is a condition characterized by a total or partial lack of circulating insulin resulting in metabolic abnormalities in the body. The goals of diet therapy for diabetes are as follows:

1. Attain and maintain desirable body weight.
2. Provide a normal growth rate in children and pregnant women.
3. Minimize glycosuria and keep the plasma glucose as near normal physiological range as possible.
4. Prevent and/or delay the development and/or progression of cardiovascular, renal, retinal, neurological, and other complications associated with diabetes.
5. Modify the diet as necessary for complications of diabetes and for associated diseases.
6. Improve the overall health of the patient by attaining and maintaining an cptimal nutritional status.
7. Provide for each patient an individualized educational and follow-up program (15, p. 6).

No other disease demands as much from the individual in terms of participation in his/her own care. When the diabetic maintains a stable blood sugar, ideal weight, and follows a nutritionally adequate diet, dietary modifications may not be required. However, the majority of diabetics do require dietary adjustments. The nutritional requirements for diabetics are the same as those for all individuals--a balanced diet. The basic nutritional requirements are given in the Recommended Dietary Allowances (3).

In 1950, a standardized diabetic exchange system for diet planning was created (19). The exchange plan provides quantitative estimates of food intake in terms of household measures. It further provides a balanced nutritious diet while allowing variety. In the system, foods

are grouped based on similarities in food values. Within each group tradeoffs are allowed to plan meals. A single exchange contains approximately equal amounts of calories and nutrients (20). As the calories increase, the number of allowed exchanges also increase.

It is recognized that as knowledge advances and new facts emerge, concepts change and dietary recommendations for diabetics should undergo continual change and modification (16). In 1976, the exchange system was modified by The American Diabetes Association, Inc. and The American Dietetic Association. The meat group was divided into three categories to allow for differences in fat content. Currently each of the three meat categories differ by almost 100 calories. Dried beans and peas have been included as meat substitutes. Although limiting amino acids in legumes may be supplemented with grains and milk, it is important to combine these foods with care and in proper amounts. The exchange lists include a few universally used ethnic foods. Additional ethnic food lists would enable the nutritionist to design meal plans meeting individual tastes within the perspective of available foods and prices at the local level and methods of food preparation commonly used in a specific locality (15).

Since premature vascular disease is often a complication associated with diabetes, nonfat fortified milk, lean meat, and the use of polyunsaturated rather than saturated fats should be stressed. Starchy vegetables are in the bread exchange group because caloric and carbohydrate values of the average serving of these foods equal that of the bread exchanges.

One very important objective in dietary treatment is control of caloric intake to obtain and maintain ideal body weight. According to

The American Diabetes Association, nutritional experts now recognize that as much as 50 percent of the nation's population and the majority of individuals with diabetes now using insulin are obese (20 percent or more overweight) (15). Oftentimes weight loss alone will reverse the glucose intolerance and reduce the risk factors (5, 6, 7, 8). Regular scheduling of meals helps maintain metabolic management, especially in those individuals requiring insulin.

In recent years there have been many alterations of the traditional diabetic diets. They have become more flexible in meeting the patients' and families' tastes, income, and food habits. West (5, 8) advocates that 30 to 45 percent of total calories should be from starch and other polysaccharides (cellulose, hemicellulose, pentosans, and pectin), 5 to 15 percent of total calories from sugars and dextrins (almost exclusively natural sugars mainly in fruits and milk), 45 to 55 percent of total calories from total carbohydrate, 25 to 35 percent of total calories from fat (half saturated), 12 to 24 percent of total calories from protein, and if chosen, 0 to 6 percent of total calories from alcohol. Higher levels of carbohydrate and lower levels of fat would be desirable but not feasible because this would differ so from the existing diet of the society. The reasons for the desired shifts in carbohydrate and fat levels is evidenced by research which correlated dietary saturated fat with incidence of atherosclerosis. Second, atherosclerotic lesions were cited as the major cause of death and disease among the North American diabetics. The final argument was that hyperglycemia and insulin needs were related to total calories and not dietary carbohydrate (5, 6, 8).

High carbohydrate diets have been found acceptable for diabetic patients when their calorie level is controlled. In the diabetic

population, a low fat diet has been associated with lower levels of diabetic complications. West (6) believes a high fasting triglyceride level is due to an excess of calories. Also, when carbohydrates are severely restricted, the diet is generally higher in fats.

Differences in Management Necessitated by Insulin-Dependent Versus Noninsulin-Dependent Diabetes

There are two recognized types of diabetes mellitus: insulin-dependent diabetes (primarily children) and obese adult onset diabetic persons who generally do not require insulin. Individuals requiring insulin generally average about 20 percent or more of all known diabetes cases. Insulin-dependent diabetes usually appears abruptly in childhood or young adulthood. The pancreas produces an inadequate amount of endogenous insulin and the individual needs exogenous insulin administered daily (15).

The predominant form of diabetes is noninsulin-dependent diabetes. Ninety percent or more of the noninsulin-dependent diabetics are overweight at the time of onset. The majority of individuals are also generally over age 35. Nearly all of these individuals do produce enough insulin to keep the plasma glucose normal when they have lost excessive weight (5, 8, 15).

Factors such as obesity, severity of the disease, age, and type of medication affect the dietary strategy for the patient. The basic differences between the two forms necessitate differences in management and control.

In children the onset and symptoms are very abrupt, often without warning. In adults the onset of symptoms are gradual. Also, the child's

diabetic condition will usually become more severe as he grows and matures. Obesity is generally uncommon among children because their food is generally abnormally utilized because of insulin deficiency. The majority of adult diabetics are obese. The majority of diabetic children do require insulin, since they have few or any functioning cells of the islets of Langerhans. In children, the control of reactions is difficult because of the activities and emotions of the child.

The dietary strategies for the nonobese, insulin-dependent diabetic vary. A decrease in calorie consumption is not necessary because most are at ideal weight or underweight. It is seldom important to protect or improve beta-cell function as the cells are generally non-functioning. It would be desirable to increase the frequency and number of feedings. To maintain day-to-day consistency of intake of calories, carbohydrate, protein, and fat is important. Consistency of ratios of carbohydrate, protein, and fat for each of the feedings is desirable. There is a higher insulin requirement immediately following a high carbohydrate meal compared to a low carbohydrate meal. Consistency in the time of meals is important. It is appropriate to allow extra food for unusual exercise to possibly prevent reactions. It is important to use food to prevent or treat hypoglycemia. During complicating illness, it is also important to provide small frequent feedings or give carbohydrate intravenously to prevent starvation ketosis (5).

The dietary strategies for the obese adult onset diabetic are not as crucial as for the nonobese insulin-dependent diabetic. One of the foremost strategies is to decrease the number of calories in an effort to lose unneeded pounds. Hopefully, weight loss will stabilize the condition and blood sugar. Another priority is to improve the pancreatic

beta cell function. This can be done by incorporating a daily exercise program. Exercise seems to improve sensitivity to insulin. An increase in the frequency and number of feedings is not desirable because this would be increasing the number of times an obese person would have the opportunity to eat. If the average calorie intake remains in low range, a day-to-day consistency of intake of nutrients is not crucial nor is consistency of the time of meals. Extra food for unusual exercise is not usually appropriate. It is generally not necessary to use food to prevent hypoglycemia. The obese diabetics who do not require insulin, do not require small frequent feedings during illness because of their resistance to ketosis (5).

Dietary Consideration During Special Needs

Exercise is important for the individual with diabetes in order that he/she achieve and maintain physical fitness. Exercise has been found to lessen the insulin requirement (14). It has been proposed that active muscles produce substances which act similarly to insulin. In-between-meal snacks are generally not required for the individual not taking insulin. For the insulin-dependent diabetic person who exercises strenuously for 45 minutes or 1 hour, an appropriate number of bread and/or fruit exchanges should be taken before exercising (15).

During acute illness the diabetes condition can become worse, oftentimes requiring special consideration and treatment. The meal plan will require adjustment to incorporate more easily tolerated foods. Usually 50 grams of carbohydrate taken by mouth can replace a missed meal. Intravenous dextrose may be an alternative for the patient who cannot take

food by mouth. The patient with insulin-dependent diabetes must continue to take insulin and eat if possible.

Both the individual using insulin and those whose diabetes is controlled by diet need to monitor their urine for sugar and acetone. Many times those whose diabetes is controlled by diet will require temporary insulin treatment and changes in management to control the diabetes during illness.

Alcohol can be worked into the meal plan of the individual with diabetes if permitted by the physician, with the exception of patients with Type IV lipid abnormalities. Alcohol generally should only be used when the diabetes is controlled and can lower blood sugar and should be consumed with meals. Any alcohol with a high sugar content should be avoided. Because of calories, alcohol should be avoided if the individual is on a weight reduction diet.

Alcohol is metabolized by the body as fat. It can be calculated as a substitute for an equivalent number of fat exchanges. One fat exchange should be removed for every 45 calories in the beverage. "A convenient formula for calculating the calories is 0.8 x proof x ounces = calories" (15, p. 11). For the individual who is at ideal weight, alcohol can be used as additional calories without substitution.

One of the complications of diabetes is diabetic nephropathy. The associated characteristics are the loss of protein in the urine, elevated levels of nitrogenous substances in the blood, hypertension, and the retention of body fluids. The term nephrotic syndrome is used when edema and proteinuria are occurring. Protein losses are compensated for by increasing the usual allowance by that amount being lost in a day's urine sample. Sodium is restricted to help control edema. During progressive

renal failure, the diet can be modified to maintain optimal general nutritional status. As blood urea nitrogen levels rise protein is restricted. Progressively, if renal function fails, the daily protein allowance may be reduced to 0.2 grams per pound of desirable body weight per 24 hours, plus an amount equal to urinary losses. Carbohydrate is increased to meet caloric needs. A consideration of long-term peritoneal dialysis is the difficulty of maintaining nitrogen balance due to losses of amino acids. The restriction of potassium, water, and sodium may be required (15).

An elevated plasma triglyceride level is more common with diabetes than an elevated cholesterol level. In noninsulin-dependent diabetes hypertriglyceridemia often clears with weight loss. Dietary management generally involves restriction of cholesterol and saturated fat intake to retard atherosclerosis. Pancreatitis can develop with hypertriglyceridemia requiring a very low fat diet (15).

Diabetes Education

The ultimate target, the patient, must be knowledgeable of the disease and its inherent dietary restrictions to cope with everyday problems, maintain his useful productivity, and survive in this complex world (21). The diet is essential to aid the control of diabetes. Spano (22) stated that socioeconomic problems, cultural influence, lack of emotional stability, inadequate instruction, and/or inappropriate teaching materials result in poor adherence of the diabetic to his or her prescribed diet.

A study of diabetics' characteristics, attitudes, and knowledge showed that the greatest concern of 606 subjects was insulin injection.

There was little correlation between education of the participants and concerns about having diabetes. There was also little or no correlation between the education of the participants and their knowledge of diabetes (23).

A research study at Auburn University correlated dietary knowledge with the control of diabetes mellitus. The researcher found that the mean score on a test for diabetic diet knowledge was 34.3, based on a possible score of 100 points. The majority of 50 respondents were unable to give correct responses to elementary diet questions. The sample consisted of 50 male diabetic patients attending an outpatient clinic at the Veterans Administration Hospital in Montgomery, Alabama. The patients were scheduled to attend the clinic according to consultant physicians' recommendations. Those needing more exacting care attended more frequently. No relation existed between duration of disease and control status (24).

A review of the available literature showed the extent to which diabetics do not understand and follow their diet prescriptions. The reasons for failure are many. Many diet prescriptions lack individualization that take into account acceptability over a long period of time. There is evidence of lack of knowledge of the physician and dietitian in relation to the various types of diabetes. There appears to be ineffective and wasted effort in diabetes counseling (6).

Deckert (25) investigated whether outpatient supervision of juvenile diabetics related to the survival of the patients and the cost versus benefits of the treatment. Through follow-up visits, survival with the disease was prolonged by almost 12 years. These findings suggest that

outpatient supervision of diabetes in a subspecialized program is beneficial for patients and involves relatively little cost.

The outpatient programs are of benefit in that the patient is made aware of his metabolic control at regular intervals. The patient is also subject to new and expanding information concerning diabetes during program visits. Through exposure to the clinic, the patient may develop new treatment and living habits which could help prevent complications. Clinics also help the patient to socially adapt (25).

According to Hoffman (26), "successful education of the insulin-dependent child and his family is a major factor in the reduction of acute complications in diabetes" (p. 285). Hoffman initiated a program in which the diabetic was actively involved in the management of his diabetes. A telephone answering service was created with qualified professionals to answer questions between the patients' clinic visits. The results of such a program were a decrease in hospital admissions and also a decrease in hospital days per admission. These decreases were explained by increased available advice, regular reinforcement of education, and improved coordination of service. Ninety-two percent of the calls concerned both low and high blood sugar.

Several investigators recognized the importance of diabetes summer camps for children and adolescents as one form of education. Some of the benefits derived from a camp experience are improved diabetes management, gains in self-confidence, and gains in self-motivation (27, 28, 29).

In a study by Collier (30), the level of knowledge of diabetes and diabetes management practices in adolescent diabetics and the corresponding knowledge level of their parents was investigated. General knowledge

and control, insulin items, urine testing, and dietary items were tested. It was concluded that additional education was necessary for both parents and adolescents concerning insulin and urine, since the control and maintenance of diabetes is so crucially related to the two items. There were also proportional differences on almost all of the dietary questions and comprehension and understanding were poor.

Diabetes managment hinges on an educated and knowledgeable patient and family working together. Etzwiler (9) studied the role of family, society, and academic implications of diabetes and its management and found that many of the adolescents and their parents lacked knowledge of the fundamental principles of the disease. Because the mother assumes such an important role in the management of diabetes (e.g., doctor consultations, helping with urine testing and insulin administration, preparation of meals), she is therefore better informed than the rest of the family.

The principles of programmed learning are currently being researched and applied to aid the patient with diabetes in their dietary management. Programmed learning involves self-learning with the use of video slides and synchronized tape recordings which supplement the interview given by the dietitian. Active involvement in the learning process could lead to desirable behavioral changes in the self-dietary management among patients on special diets.

Programmed learning also saves valuable time for the dietitian, thus allowing her more time for other areas of community health. Patients utilizing audio-visual teaching techniques have also scored higher on post-test scores versus those patients who were instructed in the traditional bedside manner (31 through 35). It is the dietitian's

responsibility to motivate the patients and to involve them in their individualized diet instruction and treatment. When a dietitian counsels a patient on a diet, she/he is only doing part of the job unless she/he finds out why the patient will not or cannot follow his/her diet.

Diabetes education programs should be continually evaluated and revised as needed. Some criteria to evaluate educational programs are: (1) Does the program contain the vital information necessary for understanding self-management? (2) Is the information being transmitted to the patient? (3) Does this information improve compliance to the health care prescription? (4) Does compliance alter outcome and progress of care? (36).

West (6) has investigated causes of failure to successful diet therapy. Many professionals fail to recognize the obstacles to be overcome. Some deterrents to successful diet therapy include lack of individualization, lack of sufficient education to understand the diet instructions, misunderstanding by the patient and his family on the general goals and priorities of the diet, or a defective patient education system. In addition, the physician, dietitian, or nurse may have a poor understanding of diet therapy principles.

Currently, there are misunderstandings and uncertainties about the effects of carbohydrates. Research has shown that carbohydrate levels can be increased threefold with no need to increase the insulin requirement, yet many professionals still feel carbohydrates are bad for people with too much sugar in their blood. The loss of unnecessary weight is also very important for the diabetic (6).

There is failure to relate dietary objectives to the specific type of diabetes. The differences in dietary objectives for the person with

mild diabetes who does not require insulin and the insulin-dependent diabetic are very different, and any attempt to generalize about diabetic diets would be improper. The terms such as free diet, strict diet, and diabetic diet can cause misinterpretation among professionals. Many times calories are inappropriately restrictive for insulin-dependent nonobese men and children. Oftentimes there are many problems between the physician and dietitian in relation to who designs, implements, and modifies the diet prescription. West (6) has devised a checklist for dietitians and physicians to use when formulating and implementing a diet prescription for a specific patient (Appendix A).

Screening and Detection

Currently the justification of mass screenings has become a controversy with health care professionals. Some areas of concern involve the cost, the time, the number of diabetics identified, and the number brought under treatment. West (17) found that costs per new case exceeded 150 dollars, not including the time of the participants. Some considerations in favor of mass screening programs are that they present opportunities for professional education, research, and public education. Early detection of diabetes can mean reversibility in severity. Complications such as ketoacidosis and gangrene are less likely in an individual who is aware of his condition. About one-quarter of cases discovered in mass screenings have symptoms that can be relieved immediately by treatment. Costs do need to be considered in the assessment of any program, the cost of the professional, the cost to the participant, and the cost of the materials and the facility involved. Some considerations when mass screenings are justifiable are a reasonable yield of new cases per

dollar spent; where new diabetics will actually be placed under treatment, and where education and research are possible (17).

Summary

A review of available literature showed that many diabetics lack knowledge of the disease, how to manage the diet, and a lack of comprehension of dietary items. Such findings suggest the need for additional diabetes education studies, since the management of diabetes hinges on an adequate knowledge of the disease and its dietary principles. Hopefully, this study can be used to add to a body of knowledge which will be used by nutritionists in preparing appropriate educational materials and nutrition education curricula suitable for the participants of diabetic screening programs. Consequently, further research is necessary to identify the extent to which diabetics lack basic knowledge and to make recommendations about improving their knowledge.

CHAPTER III

METHOD

Introduction

The material in this chapter is presented in four sections. Section one is a description of the research design and section two describes the population. Data collection, which includes the instruments, scoring, the pilot test, and the main study, is described in section three. Data analysis is discussed in the last section.

Research Design

The research design used in the study was the descriptive status survey. Descriptive research looks at differences or relationships. Survey questionnaires were used. The survey method gathers data from a relatively large number of cases at a particular time (37). Surveys can be used to justify improvements in an already existing situation. According to Van Dalen (38), survey studies determine adequacy or status by comparing it with selected standards.

Population

The accessible population for the study consisted of individuals who participated in the diabetes screening program conducted by The American Diabetes Association, Eastern Oklahoma chapter in Tulsa, Oklahoma, for

five consecutive Fridays during late spring and early summer of 1979. Eighty-five individuals ranging in age from 6 to 75 participated in the study. There were about the same number of males and females, and the participants had varying levels of education, types of educational experiences, occupation, length of time they have had diabetes mellitus, blood relatives with diabetes, blood glucose levels, and control of the disease by insulin, OHA, or diet only.

Data Collection

Planning and Development

During Fall 1978, a day was spent at the screening clinic in Tulsa to observe the diabetes screening process and to investigate the feasibility of conducting a research project at the facility. On February 15, 1979, the Executive Committee of the Eastern Oklahoma Chapter of The American Diabetes Association, Tulsa, Oklahoma, approved the research request (Appendix B).

Instrumentation

The dietary knowledge test was developed to assess the dietary knowledge base of participants in the urban diabetes program. Data gathering instruments utilized by other researchers were used as references to develop the dietary knowledge test (22, 23, 24).

The initial instrument tested diabetes, insulin, and dietary knowledge of participants. A question grid was constructed to guide the researcher in the formulation of the type, number, and cognitive level of questions. A panel of experts composed to two clinic dietitians, five

Food, Nutrition, and Institution Administration faculty, and a dietitian working in a diabetes education center affiliated with St. Francis Hospital, Tulsa, Oklahoma, was asked to review the questions in terms of content validity and clarity (Appendix B).

Based on suggestions from the panel of experts, the instrument was revised to emphasize questions on dietary knowledge and attitudes of participants toward diabetes rather than knowledge of the disease itself or insulin. Revised copies of the dietary knowledge test were sent out to the panel of experts for validation and approval. A biographical and attitudinal questionnaire was also developed to accompany the dietary knowledge test, and the panel of experts checked for face validity and approved the questionnaire. Further revisions were made and the final draft of the instruments was pilot tested. The instruments were administered to six diabetics from the Stillwater area for their reactions, comments, and/or suggestions concerning how the test could be improved. The six individuals had no problems in filling out the biographical and attitudinal questionnaire and in comprehending the dietary knowledge questions. Copies of the instruments were then prepared for the main study (Appendix C).

The dietary knowledge test included 20 test items. Fifteen of these were for all participants and included ten questions related to dietary knowledge and five questions based on the exchange list system. For these five questions, a copy of the Exchange Lists for Meal Planning (20) was provided to the participants to ensure that they could apply basic knowledge of the exchange list system rather than to test their memory. For the remaining five questions, two sets of comparable questions were prepared. One set was for participants taking insulin, while the other

set was for those taking OHA or who controlled the disease by diet only. For the insulin dependent, the questions were on knowledge of insulin relative to exercise, missed meals, and illness. For those who controlled the disease by OHA or diet, the questions were relative to foods and weight control. The test papers were color coded yellow for participants on insulin and pink for those on OHA or diet only.

The dietary knowledge test was scored by giving five points for each item correctly marked. This provided a score range of from 0 to 100. Scores were used in analyzing data.

The diabetes screening clinic in Tulsa, Oklahoma, operated every Friday from 9:00 to 12:00 o'clock in the morning. Beginning May 25, 1979, the researcher attended the clinic on five consecutive Fridays to collect data for the study. The researcher read the following statement to each participant before proceeding with the interview:

> In conjunction with writing a thesis, I am attempting to gather data concerning the diabetic and his dietary knowledge. This will consist of a short interview and a test for you to complete. The information I collect will be held confidential and your name will not be used in any way. It is a completely voluntary program, and if you do not wish to participate, you are not obligated to do so. Would you like to participate in the study? Are there any questions?

Some of the participants who came to the program were diagnosed diabetics while others were members of families where diabetes had occurred. Some of the participants visited the clinic weekly to have their blood glucose checked. On a typical clinic day, an average of 45 to 50 participants attended the screening program. About 250 individuals visited the clinic during the five Fridays data were collected, but were not tested because they did not meet the criteria established for subject selection. Only those who were diagnosed diabetics were tested.

The participants arrived at various times since prior appointments were not scheduled. Since there was a required waiting period, there was time to administer the dietary knowledge test and the biographical and attitudinal questionnaire. After the participants registered with the receptionist, they were briefed by the researcher about the objectives of the study. Upon consent, the test instruments were administered. To assure understanding and complete answers on the instruments, the researcher was available to answer questions and check the forms for completeness when they were returned; in instances in which a six-year-old and a thirteen-year-old were involved, the researcher translated a few of the questions. All forms were individually filled out by the participants. Complete anonymity for the participants was assured. There were only three individuals who refused to participate in the study.

Blood glucose levels of the 85 participants in the study were taken by a nurse at the clinic and immediate blood glucose levels were determined before the participants left the facility. Participants were generally instructed to eat two hours prior to screening; hence the blood glucose levels were approximately two hours postprandial levels.

Data Analysis Procedures

Prior to statistical analysis, data were recorded, organized, coded, and keypunched for processing by the computer. The Statistical Analysis System (39) was utilized to generate and analyze some of the data. Standard statistical procedures were used to test the homogeneity of the population and to test the objectives. The method of fitting constants was employed to statistically analyze dietary knowledge scores and blood

glucose levels. It is the appropriate method where some possible categories contain no observations (40). The level of significance established for use in the statistical analysis was 0.05. Significance implies that the difference between two means are in probability real differences and not chance occurrences.

CHAPTER IV

RESULTS

Characteristics of Participants

This study describes 85 individuals with diabetes mellitus who came to the screening program five consecutive Fridays during late spring and early summer of the 1979 semesters. About 250 individuals visited the clinic during the research period but were not tested because they did not meet the criteria established for subject selection. The total sample of 85 consisted of 43 females (51%) and 42 males (49%). Based on the criteria of medication, 38 individuals (45%) required insulin while 47 individuals (55%) required oral hypoglycemic agents or controlled the disease by diet only (Table 1).

Table 1. Participants by sex and medication

sex	medication	
	OHA or diet only N	on insulin N
male	21	21
female	26	17

Although the demographic instrument had age in six categories, data presented will only be in three categories because of lack of adequate numbers of individuals in some of the categories. The three age categories were 20 years and under, 21 to 60 years, and 61 years and over. Of the total population, 40 individuals (47%) were in the 61 years and over category. When analyzed by medication, 29 (34%) of the 40 individuals controlled the disease by OHA or diet only, while 11 (13%) required insulin. In contrast, all 12 (14%) individuals in the category 20 years and under required insulin (Table 2).

Table 2. Participants by age categories and medication

age in years	medication	
	OHA or diet only N	on insulin N
20 years and under	0	12
21 to 60 years	18	15
61 years and over	29	11

Level of education completed by the participants was originally in six categories but will be presented in only two categories: less or equal to 12 years, and over 12 years of education. About 60 percent of the total population were in the less or equal to 12 years category in terms of level of education (Table 3).

Table 3. Participants by education and medication

years of education	medication	
	OHA or diet only N	on insulin N
12 years or less	28	21
over 12 years	19	17

In general, participants indicated having a variety of educational experiences. There was involvement in group instruction, self-instruction as well as individualized instruction by professional medical personnel. About three-fourths of the participants had access to educational materials. Individuals requiring insulin appeared to have had more involvement in diabetes education than those controlled by OHA or diet only. Perhaps those on insulin were interested in knowing more information about the management of the disease. The category accessibility to written materials received the highest number of responses. The number and type of educational materials read, however, were not available for examination regarding content, cognitive level, usefulness or other factors (Table 4).

Professional medical personnel who gave diabetic instructions as indicated by the 85 participants included dietitians, doctors, nurses, and others such as dentists or other clinical personnel. Examination of the data indicated that the majority of instructions were given by dietitians and doctors. Chi square determinations on diabetic education experiences that were significant included class ($p < 0.05$) and instruction

Table 4. Participants by education experiences

diabetes education experiences	medication: OHA or diet only, no N	medication: OHA or diet only, yes N	medication: on insulin, no N	medication: on insulin, yes N	Chi square	observed significance level
class	37	10	16	22	12.000	0.0005*
seminar	42	5	29	9	2.599	0.1069 NS
written materials	11	36	8	30	0.067	0.7958 NS
instructed by dietitian	32	15	14	24	8.260	0.0041**
instructed by doctor	27	20	15	23	2.715	0.0994 NS
instructed by nurse	39	8	26	12	2.475	0.1157 NS
other	46	1	36	2	0.607	0.4360 NS

*$p < 0.05$.
**$p < 0.01$.
NS not significant at 0.05 level.

by dietitian ($p < 0.01$). About the same number of participants who were on insulin, or on OHA or diet only indicated that they received instructions from their physicians. In most instances, the experiences were not actual diet instructions but printed information (Table 4).

The demographic variable "occupation" was analyzed according to Treiman's (41) occupational categories. About one-fourth of the total population was comprised of service workers and housewives. There were about the same number of participants who were retired, professional, technical and related, and students (Table 5).

Three-fifths of the 99 responses regarding blood relatives who have diabetes were from participants who were on OHA or who controlled diabetes by diet only, while the remaining two-fifths were from participants on insulin. The "other relatives" category received the most responses. This category represented uncles, aunts, cousins, and children. Brothers and sisters category received the second highest number of responses (Fig. 1).

The length of time participants had diabetes was analyzed on the basis of less than, or greater than, five years. Participants on insulin were primarily in the category greater than five years rather than the category less than five years. The reverse is true for those who were on OHA or diet only (Table 6).

Based on blood glucose level determinations at time of screening which were two hours postprandial, the pattern in terms of number of participants who were on OHA or diet only and those on insulin, respectively, were as follows: normal level--there were four times as many participants on OHA or diet only as there were on insulin; slightly elevated--there were twice as many participants on OHA or diet only as there

Table 5. Participants by occupation and medication

classification of occupation	medication				totals	
	OHA/diet only		insulin			
	N	percent	N	percent	N	percent
service workers and housewives	16	19	7	8	23	27
retired	12	14	3	4	15	18
professional, technical and related workers	5	6	8	9	13	15
students	0	0	12	14	12	14
production and related workers, transport equipment operators and laborers	5	6	3	4	8	9
sales workers	5	6	1	1	6	7
clerical and related workers	4	5	1	1	5	6
administrative and managerial workers	0	0	3	4	3	4
					85	100

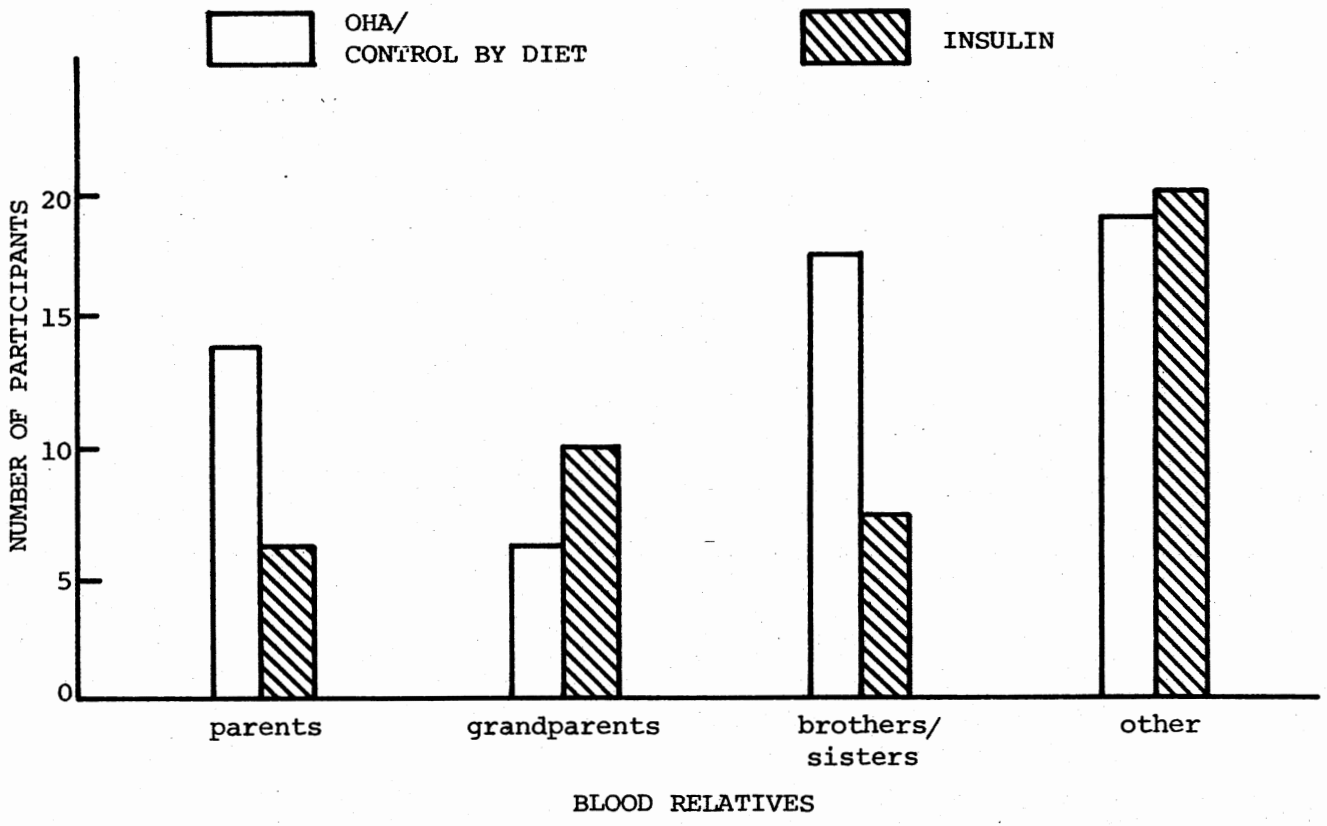

FIG. 1. Participants by blood relatives who have diabetes and by medication

were on insulin; moderately elevated level--there were twice as many participants on insulin as there were on OHA or diet only; highly elevated level--there were three times as many participants on insulin as there were on OHA or diet only. Participants on insulin tended to have moderately elevated to highly elevated blood glucose levels, while participants on OHA or diet only tended to have normal to slightly elevated blood glucose levels (Table 7).

Table 6. Participants by length of time of diabetes and medication

length of time	medication	
	OHA or diet only N	on insulin N
less than 5 years	29	12
greater than 5 years	18	26

Table 7. Participants by blood glucose levels

glucose blood levels	medication	
	OHA or diet only N	on insulin N
normal level[1] less than 120 mg percent	17	4
slightly elevated level 120 to 200 mg percent	20	11
moderately elevated level 201 to 300 mg percent	6	12
highly elevated level greater than 300 mg percent	4	11

[1]Normal blood glucose level (3, p. 493).

Attitudes of Participants

In general, the 38 participants who were on insulin had positive attitudes towards diabetes mellitus and its inherent dietary restrictions. All but one of the participants indicated that they have received good, helpful, and understandable dietary instructions. Almost all of those on insulin also indicated that they were not a burden to others, that their diet was not hard to live with, and thus believed in following their diet plan.

The 47 participants who controlled diabetes by OHA or diet only also showed positive attitudes towards diabetes mellitus and its inherent dietary restrictions, but to a lesser extent than those who were on insulin. All but two of the participants felt dietary adherence was necessary and 41 of the 47 felt they have received beneficial dietary instructions. Although 35 (75%) individuals felt diabetics were not a burden to others and that their diet was not hard to follow, 9 (20%) were not sure whether diabetics were a burden or not, and felt that their diet was too restrictive. A little over half of the participants believed that they should not skip a prescribed meal. Thirteen of the 47 participants indicated that they could skip a meal occasionally, while 8 participants were not sure whether or not to skip a prescribed meal.

Dietary Knowledge Scores and Blood Glucose Levels

To analyze dietary knowledge scores and blood glucose levels, the population was subdivided by age (three categories), medication (two categories), and by sex (two categories). The number of participants based on these categorizations are shown on the first column of Table 8.

There were no participants in the age category 20 years and under who were on OHA or diet only. There was a disproportionate number of participants in all other categorizations. The unadjusted and adjusted means for dietary knowledge scores and blood glucose levels of the 85 participants in the study are shown in Table 8. Participants in the age category 21 to 60 years who were on insulin tended to have higher dietary knowledge unadjusted mean scores than the participants in the other categories, although this was not true on the adjusted means column. All of the participants on insulin tended to have elevated blood glucose level unadjusted means than those on OHA or diet only. The adjusted means on blood glucose levels, however, showed a more uniform elevated level for all categories of participants.

The results of the study indicated a need for nutrition education specifically on dietary principles related to diabetes mellitus, the use of the exchange lists for meal planning, and general consumer education. The mean raw scores on the dietary knowledge test of the 47 participants on OHA or diet only was 75 percent, while the mean raw scores of the 38 participants on insulin was 80 percent. The questions most often answered incorrectly dealt with sugar and sugar substitutes, lipids, alcohol, use of convenience foods, foods during illness, replacement of missed meals, weight loss, and caloric control.

Even when a copy of the Exchange Lists for Meal Planning (20) was provided, many participants had difficulty in making practical applications of the exchange lists system. A majority of the participants had no knowledge that one-half cup of dried beans and peas could be substituted for one exchange of lean meat. Many participants could not distinguish between which raw vegetables could be used as desired. The

Table 8. Dietary knowledge score and blood glucose level means, unadjusted and adjusted for: age, medication, sex, age and medication, age and sex, and medication and sex

N	age categories (years)	medication	sex	unadjusted means		adjusted means	
				dietary knowledge score (percent)	blood glucose level	dietary knowledge score (percent)	blood glucose level
5	20 and under	insulin	F	64	231	77	230
7	20 and under	insulin	M	74	264	71	228
13	21 to 60	OHA or diet	F	79	175	74	229
5	21 to 60	OHA or diet	M	78	216	74	229
8	21 to 60	insulin	F	89	230	74	229
7	21 to 60	insulin	M	87	209	74	229
13	61 and over	OHA or diet	F	72	160	77	230
16	61 and over	OHA or diet	M	69	148	71	228
4	61 and over	insulin	F	75	290	71	228
7	61 and over	insulin	M	84	219	77	230

question concerning the equivalent of one pancake was difficult for several participants.

Several participants were not aware that ingredients in labels ending in "ose" indicated that the food contained sugar, and did not recognize sorbitol as a sugar substitute even though many sugar-free products list sorbitol as an ingredient on the label. Some of the participants mentioned that they had been instructed not to use sorbitol.

There was lack of knowledge on how to decrease fat and caloric consumption and many participants did not know the recommended form of dietary fat for the person with diabetes. They could not distinguish between saturated and polyunsaturated fats and which were from plant or animal orgin. Many participants were also unaware that convenience foods could be incorporated into the diabetic diet.

For those individuals who required insulin, there was confusion over the question concerning alcoholic beverages. Many participants had been instructed not to consume alcoholic beverages; therefore, they were unaware that alcohol could be substituted for an appropriate number of fat exchanges, if permitted by the physician. A missed meal is generally replaced by 50 grams of carbohydrate, but many participants were not aware of this and some thought that protein could replace a meal. During periods of illness, to maintain caloric and carbohydrate intake, sweetened gelatine and carbonated beverages are permissible; however, many participants thought they could not consume any food containing sugar.

An analysis of variance was determined by the Statistical Analysis System (39) on dietary knowledge scores made by the participants on the test administered, and blood glucose levels taken from the biographical questionnaire to ascertain the main effects of age, medication, and sex.

The analysis of variance showed no interaction between age, medication, and sex. Presumably, there was no interaction between variables because of the sample size. Age significantly ($p < 0.05$) affected dietary knowledge scores, while medication significantly ($p < 0.01$) affected dietary knowledge scores and blood glucose levels (Table 9).

Table 9. Analysis of variance table, regression coefficients, and statistics of fit for dietary knowledge scores and blood glucose levels

source	dietary knowledge scores			blood glucose levels		
	sequential mean squares	F value	observed significance level	sequential mean squares	F value	observed significance level
age	1088.63	3.59	0.032*	24115.77	2.80	0.065
medication	1623.65	5.35	0.024**	62358.44	7.25	0.009**
age and medication	2.12	0.01	0.934	13477.28	1.57	0.215
sex	38.39	0.13	0.723	478.67	0.06	0.814
age and sex	140.57	0.46	0.637	5248.71	0.61	0.551
medication and sex	109.09	0.36	0.551	13717.45	1.59	0.211
age, medication and sex	156.41	0.52	0.475	9.97	0.00	0.973
		C.V.	22.76%		C.V.	46.90%
		overall mean	77		overall mean	198

*p < 0.05.
**p < 0.01.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

Summary

The purpose of this study was to assess the characteristics, attitudes, and dietary knowledge of persons with diabetes mellitus in an urban diabetes screening program. The data collected will hopefully add to a body of knowledge which can be used by nutritionists in preparing appropriate educational materials and nutrition education curricula for diabetes screening programs.

Diabetes is a world wide health problem. As a cause of death, diabetes is more common now than in the past. Diabetes is a major socio-economic ill costing more than two billion dollars annually in terms of loss of earnings, hospitalization, medication, and rehabilitation (3).

Literature reviewed related to factors influencing diabetes, the metabolic effects of diabetes, the principles of nutrition and dietary recommendations for patients with diabetes, differences in management necessitated by insulin-dependent versus noninsulin-dependent diabetes, dietary considerations during special needs, and diabetes education. The review of literature suggested the need for additional diabetes education studies, since the management of diabetes hinges on an adequate knowledge of the disease and its dietary principles.

The research design used was the descriptive status survey. Survey questionnaires were used. The accessible population consisted of

individuals who participated in the diabetes screening program conducted by The American Diabetes Association, Eastern Oklahoma Chapter in Tulsa, Oklahoma. Eighty-five individuals ranging in age from 6 to 75 participated in the study.

The total sample of 85 consisted of 43 females and 42 males. Based on the criteria of medication, 38 individuals required insulin while 47 required OHA or controlled the disease by diet only. The dietary knowledge test included 20 test items. Fifteen of the twenty were common for all participants. For the remaining five questions, two sets of comparable questions were prepared. One set was for participants taking insulin, while the other set was for those taking OHA or who controlled the disease by diet only.

Of the total population, 40 individuals (47%) were in the 61 years and over category. On level of education, about 60 percent of the total population were in the less or equal to 12 years category. Participants indicated a variety of educational experiences. Experiences that were significant included class ($p < 0.05$), and instruction by dietitian ($p < 0.01$). In terms of occupation, the majority of the population was comprised of service workers and housewives, and retired personnel. The majority of responses regarding blood relatives who have diabetes were from those individuals not requiring insulin. The length of time participants had diabetes was analyzed on the basis of less than, or greater than, five years. Those on insulin were mostly in the category greater than five years, while the reverse was true for those on OHA or diet only. In general, all participants displayed positive attitudes towards diabetes and its inherent dietary restrictions.

On the dietary knowledge test, the 38 participants on insulin scored

slightly higher than the 47 participants on OHA or diet only. Questions most often answered incorrectly were those on sugar and sugar substitutes, lipids, alcohol, use of convenience foods, foods during illness, replacement of missed meals, weight loss, and caloric control.

The Statistical Analysis System (39) was utilized to analyze data. Standard statistical procedures tested homogeneity of population and the method of fitting constants was used to analyze dietary knowledge scores and blood glucose levels. An analysis of variance on dietary knowledge scores and blood glucose levels showed no interaction between age, medication, and sex because of sample size. Age significantly ($p < 0.05$) affected dietary knowledge scores, while medication significantly ($p < 0.01$) affected dietary knowledge scores and blood glucose levels.

Recommendations

The results of this study indicated that nutrition education for the potential and/or diagnosed diabetic concerning dietary principles relative to diabetes mellitus, the use of the exchange lists for meal planning, and general consumer education needs further improvement. Based on these results, the following are recommended:

1. Persons with diabetes and possibly families of diabetics need to be taught the most effective use of the exchange lists for meal planning.

2. Effective methods are needed to monitor closely and control blood glucose levels of insulin-dependent diabetics.

3. Consumer education materials about diabetes mellitus; planning diabetic meals; exchange lists for eating out; protein, carbohydrates, and fats; one dish meals, eating in later years; food selection,

preparation, and storage; and food additives and labeling should be developed and made available to patients and families.

Further studies might be conducted to show:

1. Existing diabetic education curricula and instructional procedures that are effective but under utilized.

2. Effective and efficient methods of reaching and motivating potential and/or diagnosed diabetics to respond and benefit from appropriate nutrition education programs.

Although the number of times data were collected at the urban screening program was adequate for the study, perhaps at another time data could be collected at several centers and for a longer period of time. When members of families are present during the administration of the test, the test should be administered in a booth or separate area to avoid the influence of family members.

Since the majority of participants were in the age category 61 years and over, educational materials made available at the clinic should be in large print for easy reading. A number of children also attended the clinic; hence appropriate education materials such as easily understood diagrams and pictures to describe insulin injection, an explanation of what diabetes is, and its effects upon the life style of a child should be provided.

Hopefully, the results and recommendations offered in this study can be utilized by nutritionists in diet instructions to diabetics, in diabetes classes, and in developing appropriate educational materials and nutrition education curricula for diabetes screening programs. In addition, it is hoped that educational materials and nutrition education

curricula developed can better assist diabetic individuals in the effective management of their disease.

REFERENCES

(1) Biermann, J., and Toohey, B.: The Diabetic's Sports and Exercise Book. Philadelphia: J. B. Lippincott Co., 1977.

(2) Moss, J. M., DeLawter, D. E., and Meloni, C. R.: Monograph: 2 Diabetes. Kansas City, Mo.: American Academy of Family Physicians, 1974.

(3) Robinson, C. J.: Robinson's Normal and Therapeutic Nutrition. 15th ed. New York: MacMillan, 1977.

(4) Brother, M. J.: Diabetes the New Approach. New York: Grosset and Dunlap Co., 1976.

(5) West, K. M.: Diet and diabetes. J. Postgrad. Med. 60: 209, 1976.

(6) West, K. M.: Diet therapy of diabetes: An analysis of failure. Ann. Intern. Med. 79: 425, 1973.

(7) West, K. M., Oakley, E. L., Sanders, M. E., and Rubenstein, A. H.: Nutritional factors in the etiology of diabetes. In Keen, H., Pickup, J. C., and Talwalkar, C. V., eds.: Epidemiology of Diabetes and Its Vascular Complications. Bombay: International Diabetes Federation, 1976.

(8) West, K. M.: Prevention and therapy of diabetes mellitus. Nutr. Rev. 33: 193, 1975.

(9) Etzwiler, D. D., and Sines, L. K.: Juvenile diabetes and its management: Family, social, and academic implication. J.A.M.A. 181: 304, 1962.

(10) Jernigan, A. K.: Diabetics need to know more about diet. Hospitals, J. Am. Hosp. A. 42: 91, 1968.

(11) Holland, W. M.: The diabetes supplement of the national health survey. J. Am. Hosp. A. 52: 387, 1968.

(12) Stulb, S. C.: The diabetes supplement of the national health survey. J. Am. Dietet. A. 52: 391, 1968.

(13) Etzwiler, D. D.: What the juvenile diabetic knows about his disease. J. Pediatr. 29: 135, 1962.

(14) Schmitt, G. F.: Diabetes for Diabetics. Miami, Fl.: The Diabetics Press of America, Inc., 1968.

(15) The American Diabetes Association: A Guide for Professionals: The Effective Application of Exchange Lists for Meal Planning. New York, 1978.

(16) Bierman, E. L., Albrink, M. J., Arky, R. A., Connor, W. E., Dayton, S., Spritz, N., and Steinberg, D.: Principles of nutrition and dietary recommendations for patients with diabetes mellitus: 1971. Diabetes 20: 633, 1971.

(17) West, K. M.: Epidemiology of Diabetes and Its Vascular Lesions. 1st ed. New York: Elsevier, 1978.

(18) Oakley, W. F., Pyke, D. A., and Taylor, K. W.: Diabetes and Its Management. 2nd ed. Oxford: Blackwell Scientific Publications, 1975.

(19) Christakis, G., and Miridjanian, A.: The nutritional aspects of diabetes. In Ellenberg, M., and Riffin, H., eds.: Diabetes Mellitus: Theory and Practice. Rev. Ed. New York: McGraw-Hill, 1970.

(20) The American Diabetes Association and The American Dietetic Association: Exchange Lists for Meal Planning. Chicago, 1976.

(21) Krall, L. P.: Management of diabetes mellitus--current concepts and misconcepts. In Bajaj, J. S.: Insulin and Metabolism. 1st ed. New York: Excerpta Medica, 1977.

(22) Spano, J. O.: Assessing the dietary knowledge of diabetics. Unpublished M.S. thesis, Hunter College of the CUNY, New York, 1973.

(23) Guest, V.: Participants in a diabetic screening program: Their characteristics, attitudes, and knowledge, and the results of the testing. Unpublished M.S. thesis, Northern Illinois Univ., 1972.

(24) Hall, S.: The importance of diet knowledge in attaining optimum control of diabetes mellitus. Unpublished M.S. thesis, Auburn Univ., 1974.

(25) Deckert, T., Poulsen, J. E., and Larsen, M.: Importance of outpatient supervision in the prognosis of juvenile diabetes mellitus: A cost/benefit analysis. Diabetes Care 1: 281, 1978.

(26) Hoffman, W. H., O'Neill, P., Khoury, C., and Bernstein, S.: Service and education for the insulin-dependent child. Diabetes Care 1: 285, 1978.

(27) Marble, A.: Summer camps for diabetic children. Diabetes 1: 245, 1952.

(28) Skyler, J. S., Ellis, G. J., and Delcher, H. K.: Carolinas' camp for diabetic children I. Report of first five years of operation. N.C. Med. J. 34: 935, 1973.

(29) Lebovitz, F. L., Ellis, G. J., and Skyler, J. S.: Performance of technical skills of diabetes management: Increased independence after a camp experience. Diabetes Care 1: 23, 1978.

(30) Collier, B. N., and Etzwiler, D. D.: Comparative study of diabetes knowledge among juvenile diabetics and their parents. Diabetes 20: 51, 1971.

(31) Ohlson, M. A.: Suggestions for research to strengthen learning by patients. J. Am. Dietet. A. 52: 401, 1968.

(32) Hassell, J., and Medved, E.: Group/audiovisual instruction for patients with diabetes. J. Am. Dietet. A. 66: 465, 1975.

(33) Etzwiler, D. D.: Developing a regional program to help patients with diabetes. J. Am. Dietet. A. 52: 394, 1968.

(34) Tani, G. S., and Hankin, J. H.: A self-learning unit for patients with diabetes. J. Am. Dietet. A. 58: 331, 1971.

(35) Haimowitz, M. L.: Thoughts on helping the patient with diabetes. J. Am. Dietet. A. 61: 425, 1972.

(36) Miller, L. V., Goldstein, J., and Nicolaisen, G.: Evaluation of patients; knowledge of diabetes self-care. Diabetes Care 1: 275, 1978.

(37) Best, J. W.: Research in Education. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1977.

(38) Van Dalen, D. B.: Understanding Education Research. New York: McGraw-Hill Book Co., Inc., 1962.

(39) Barr, A. J., and Goodnight, J. H.: Statistical Analysis System. Raleigh, N.C.: Dept. of Statistics, N.C. State Univ., 1972.

(40) Steel, R. G. D., and Torrie, J. H.: Principles and Procedures of Statistics. New York: McGraw-Hill Book Co., Inc., 1960.

(41) Treiman, D. J.: Occupational Prestige in Comparative Perspective. New York: Academic Press, 1977.

APPENDIX A

DIET PRESCRIPTION CHECK LIST

Table 10. A check list for dietitians and physicians: Formulating and implementing a diet prescription for a specific patient[1]

1. *In order of priority* what are the main general purposes (not strategies or methods) of this patient's prescription?
2. How much should the patient weigh? How much does the doctor, the dietitian, and the patient think he should weigh? How much would the patient *like* to weigh?
3. What is the appropriate level of caloric consumption for this patient?
4. Does the patient require insulin? If so, is the blood glucose relatively stable, moderately labile, or severely labile? What kind of insulin is to be given, at what time, in what amounts?
5. What and when and how much would the patient *like* to eat if he did not have diabetes? Are there any special considerations relating to economic factors or to family or cultural dietary propensities?
6. Is the level of carbohydrate to be limited? To what level or range? To what extent and under what conditions, if any, are concentrated carbohydrates to be used?
7. Any special requirements concerning levels of protein?
8. Are there any specific or general requirements with respect to levels of dietary fat, either saturated or unsaturated?
9. How much alcohol is to be permitted? Under what conditions? Should alcohol be exchanged for another food? If so, what kind and in what amounts?
10. If time distribution of food is of any importance, are there specific requirements concerning [1] the relative size and timing of each of the three main meals? [2] the timing, size, and characteristics of any extra feedings?
11. To what degree is day-to-day consistency required in [1] total calories? [2] size and characteristics of specific feedings such as lunch?
12. Are dietary adjustments to be made for exercise or marked glycosuria? Of what nature?
13. Are there any special conditions unrelated to diabetes requiring special diet (for example, gout, hyperlipidemia, and renal or cardiac failure)?
14. Can all elements of the prescription be reconciled, and how should this be done? (For example, it is usually not feasible to construct a palatable diet for a lean diabetic if the prescription calls for a diet that restricts both carbohydrate and fat.)
15. What kinds and what degree of changes are to be made subsequently by the dietitian without consulting the physician?
16. What should this patient do if he finds it necessary to postpone or modify a meal (for example, attending a dinner meeting or social affair)? How should he adjust diet if his appetite fails (for example, during illness)?
17. Tactical questions: [1] How much precision is required in the various elements of this prescription? [2] What foods can be freely allowed? [3] What foods, if any, are to be weighed or measured? [4] Are any modifications of the standard exchange system appropriate, such as simplification? [5] In general, is food to be unmeasured, estimated, measured, or weighed? [6] Is it necessary or desirable to teach this patient the carbohydrate, protein, and fat content of the common foods? [7] Under what circumstances are artificial sweeteners and diet drinks to be used?
18. Has this patient's understanding of dietary principles and methods been systematically evaluated?

[1] West's check list for diet prescription (6, p. 432).

APPENDIX B

LETTER REQUESTING RESEARCH APPROVAL, RESEARCH APPROVAL, AND LETTER TO EXPERTS TO EVALUATE THE QUESTIONNAIRE

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(405) 624-5039

February 9, 1979

I am a graduate student at O.S.U. working on a master's degree in Food, Nutrition, and Institution Administration and currently writing a thesis proposal. Under the direction of my adviser, Dr. Lea Ebro, I plan to study the Diabetes Knowledge of participants that go the screening clinics in Tulsa sponsored by the American Diabetes Association, and in Oklahoma City sponsored by the Oklahoma City County Department of Health. The data collected will hopefully add to a body of knowledge which can be used by nutritionists in preparing appropriate educational materials and nutrition education programs for diabetes screening clinics.

Would it be feasible to conduct my research in your screening clinic? My study involves administering a questionnaire with 20 multiple choice questions related to diabetes mellitus, insulin, and diet to participants in two urban clinics on alternate Fridays beginning March 15, 1979 until 100 respondents are obtained.

I have had approval from the F.N.I.A. department to conduct this research, where human subjects are involved but not "at risk." Participants will not be identified in the study.

Attached is a copy of my questionnaire. It is currently being reviewed by a panel of experts for clarity and content validity. An additional page will also be attached to the questionnaire to record demographic data such as age, sex, weight, education level, occupation, blood sugar determination, and if other members of the participant's family have diabetes.

Please let me know if I can conduct my research in your clinic at your earliest convenience. Your cooperation and assistance are sincerely appreciated. If you have questions, kindly call me at 405/377-1565. Thank you.

Approved by:

Lea L. Ebro

Lea L. Ebro, Ph.D., R.D.
Adviser

Sincerely yours,

Connie S. Neumeyer

Connie S. Neumeyer
Graduate Student

American Diabetes Association
EASTERN OKLAHOMA CHAPTER, INC.

6565 SOUTH YALE – SUITE 613
TULSA, OKLAHOMA 74136
PHONE (918) 492-4047

February 15, 1979

Mrs. Connie S. Neumeyer
2803 Mark Circle
Stillwater, OK 74074

Dear Connie:

Thank you for your letter requesting permission to conduct research in our screening clinic. The Executive Committee met on Monday, February 12, 1979, and has approved your request. We will look forward to seeing you on March 15.

Sincerely,

Ann

Ann Richards,
Executive Director

AR:mjs

Oklahoma State University

Department of Food, Nutrition and Institution Administration

STILLWATER, OKLAHOMA 74074
(405) 624-5039

February 9, 1979

I am a graduate student at O.S.U. working on a master's degree in Food, Nutrition, and Institution Administration and currently writing a thesis proposal. Under the direction of my adviser, Dr. Lea Ebro, I plan to study the Diabetes Knowledge of participants that go to the screening clinics in Tulsa sponsored by the American Diabetes Association and in Oklahoma City sponsored by the Oklahoma City County Department of Health. The data collected will hopefully add to a body of knowledge which can be used by nutritionists in preparing appropriate educational materials and nutrition education programs for diabetes screening clinics.

I have visited the screening clinic in Tulsa and have worked out some of the logistics in collecting my data with the person in charge of the screening program. Participants at the screening clinic are generally in the age range of 20 to 60, with a 9th to 12th grade education. My review of literature showed that similar studies have been conducted in Illinois and in New York. For my data collection, I developed an instrument which includes nine questions related to diabetes mellitus, seven on insulin, and five on diet. You have been selected as a member of an expert panel to evaluate the instrument in terms of clarity and content validity.

Kindly send me your comments at your earliest convenience in the enclosed, stamped envelope. Your assistance and cooperation are very much appreciated.

Approved by:

Lea L Ebro
Lea L. Ebro, Ph.D., R.D.
Adviser

Sincerely yours,

Connie S. Neumeyer
Connie S. Neumeyer
Graduate Student

APPENDIX C

THE INSTRUMENTS

Blood Sugar Determination _____ Test Number ___

OKLAHOMA STATE UNIVERSITY
Department of Food, Nutrition and Institution Administration
Biographical Questionnaire

Name _____ Are you taking a shot (insulin)? Yes __ No __

I. Please circle the number in front of the answer which applies to you.

A. Sex: 1. Female (Circle one)
2. Male

B. Age: 1. Under 21 (Circle one)
2. 21-30
3. 31-40
4. 41-50
5. 51-60
6. 61 or over

C. Highest Level of Education Completed (Circle one)

1. 8 years or less
2. 9-10 years
3. 11-12 years
4. 13-16 years (college)
5. vocational school
6. graduate school

D. Diabetes Education Experiences (Circle all that apply)

1. Diabetes class
2. Diabetes seminar
3. I have read written materials
4. Hospital instruction given by a dietitian
5. Hospital instruction given by a doctor
6. Hospital instruction given by a nurse
7. Other (Please specify) _____

E. Vocation or Occupation (Please specify)

_____
(Housewife, Clerical, School Teacher, Student, etc.)

F. Blood Relatives Who Have Diabetes (Circle all that apply)

1. Father
2. Mother
3. Grandfather
4. Grandmother
5. Uncle
6. Aunt
7. Brother
8. Sister
9. Children
10. Other (Please specify) _____

G. How long have you known you had diabetes? (Circle one)

1. Less than 6 months
2. Between 6 months and 1 year
3. More than 1 year but less than 3 years
4. More than 3 years but less than 5 years
5. More than 5 years

II. Please place an (X) in the column which matches your response.

	Agree	Disagree	No Opinion
1. I feel I should follow my diet.			
2. Diabetic people tend to be a burden to others.			
3. It is okay to skip a prescribed meal occasionally, so long as the food is eaten during that day.			
4. While I prefer not having restrictions on my diet, the diabetic diet is not hard for me to live with.			
5. While on my diabetic diet, the instructions I have received have been good, helpful, and understandable.			

Dietary Knowledge Test (OHA)

III. Please select and circle the one best answer to the following questions.

1. Examples of sugar substitutes:

   a. Sorbitol, saccharin
   b. Sucrose, fructose
   c. I don't know

2. Eggs, cottage cheese, and cold cuts are primarily sources of:

   a. Protein
   b. Carbohydrate
   c. I don't know

3. You are wanting to decrease your fat and calorie consumption. A practice which will accomplish this is:

   a. The use of whole milk
   b. Trim fat from meat before cooking
   c. I don't know.

4. The recommended form of dietary fat for the diabetic is:

   a. Saturated fats
   b. Polyunsaturated fats
   c. I don't know

5. Sweet potatoes, corn, and sherbet are primarily sources of:

   a. Protein
   b. Carbohydrate
   c. I don't know

6. For the diabetic, recommended ways to cook meats are:

   a. Boiled, broiled, baked, roasted
   b. Fried, use of sauces and gravies
   c. I don't know

7. The primary purpose of the food exchange list is:

   a. To change previous eating patterns or habits
   b. To arrange foods in groups of similar composition to permit substitution within each group
   c. I don't know

8. A diabetic fruit is:

   a. Canned pineapple in heavy syrup
   b. Canned pineapple packed in its own natural juices
   c. I don't know

9. Examples of polyunsaturated fats are:

   a. Oils, salad dressing, soft margarine made with corn oil, cottonseed, safflower, soy or sunflower oil
   b. Coconut oil, beef fat, bacon, cream
   c. I don't know

10. When reading labels, ingredients ending in "ose" indicate that they contain:

    a. Sugars
    b. Proteins
    c. I don't know

11. If an overweight person with diabetes follows his diet, he should expect to:

    a. Remain the same weight but have less sugar in his blood and urine
    b. Lose weight and have less sugar in his blood and urine
    c. I don't know

12. A good source of both carbohydrate and protein can be found in:

    a. Milk
    b. Eggs
    c. I don't know

13. For the diabetic, convenience foods:

    a. Are not allowed
    b. Can be incorporated into the exchange list
    c. I don't know

14. Excellent sources of potassium and fiber are:

    a. Fruits and vegetables
    b. Meats
    c. I don't know

15. The most important treatment for those not requiring insulin is:

    a. Control of caloric intake and loss of unnecessary pounds
    b. Oral drugs
    c. I don't know

Dietary Knowledge Test (Insulin)

1. Examples of sugar substitutes:

    a. Sorbitol, saccharin
    b. Sucrose, fructose
    c. I don't know

2. Eggs, cottage cheese and cold cuts are primarily sources of:

    a. Protein
    b. Carbohydrate
    c. I don't know

3. You are wanting to decrease your fat and calorie consumption. A practice which will accomplish this is:

    a. The use of whole milk
    b. Trim fat from meat before cooking
    c. I don't know

4. The recommended form of dietary fat for the diabetic is:

    a. Saturated fats
    b. Polyunsaturated fats
    c. I don't know

5. Sweet potatoes, corn and sherbet are primarily sources of:

    a. Protein
    b. Carbohydrate
    c. I don't know

6. For the diabetic, recommended ways to cook meats are:

    a. Boiled, broiled, baked, roasted
    b. Fried, use of sauces and gravies
    c. I don't know

7. The primary purpose of the Food Exchange List is:

   a. To change previous eating patterns or habits
   b. To arrange foods in groups of similar composition to permit substitution within each group
   c. I don't know

8. A diabetic fruit is:

   a. Canned pineapple in heavy syrup
   b. Canned pineapple packed in its own natural juices
   c. I don't know

9. Examples of polyunsaturated fats are:

   a. Oils, salad dressing, soft margarine made with corn oil, cottonseed, safflower, soy or sunflower oil
   b. Coconut oil, beef fat, bacon, cream
   c. I don't know

10. When reading labels, ingredients ending in "ose" indicate that they contain:

   a. Sugars
   b. Proteins
   c. I don't know

11. Alcoholic beverages:

   a. Do not affect the person with diabetes
   b. Should be drunk with a meal or just after eating to avoid insulin reactions
   c. I don't know

12. A missed meal may be satisfactorily replaced by:

   a. A slice of cheese
   b. One cup of orange juice and two slices of toast
   c. I don't know

13. Before strenuous exercise, an insulin-dependent person should:

   a. Eat bread and/or fruit exchanges
   b. Take more insulin
   c. I don't know

14. During periods of illness, to maintain caloric and carbohydrate intake the individual using insulin can:

   a. Quit taking insulin
   b. Eat sweetened gelatine and sweetened carbonated beverages
   c. I don't know

15. Individuals taking insulin require a bedtime snack because of:

   a. The length of time between dinner and breakfast
   b. Increases in hunger
   c. I don't know

IV. With the attached exchange book, please select and circle the one best answer to the following questions:

16. One pancake 5 in. x 1/2 in. is the equivalent of:

a. One bread exchange and one fat exchange
b. Two bread exchanges
c. I don't know

17. In the current exchange system, dried beans and peas are in what exchange group?

a. Vegetable exchange list
b. Meat exchange list
c. I don't know

18. Which of the following raw vegetables may be used as desired:

a. Lettuce, parsley, radishes
b. Cabbage, carrots, green pepper
c. I don't know

19. Two tablespoons of raisins is the equivalent of:

a. One fruit exchange
b. One vegetable exchange
c. I don't know

20. One-eighth of an avocado is the equivalent of:

a. One vegetable exchange
b. One fat exchange
c. I don't know

VITA

Connie Sue Neumeyer

Candidate for the Degree of

Master of Science

Thesis: CHARACTERISTICS, ATTITUDES, AND DIETARY KNOWLEDGE OF PARTICIPANTS IN AN URBAN DIABETES SCREENING PROGRAM

Major Field: Food, Nutrition and Institution Administration

Biographical:

Personal Data: Born in Enid, Oklahoma, January 30, 1954, the daughter of Mr. and Mrs. Jack F. Harrison; married August 26, 1977, to Gary Lee Neumeyer, Tulsa, Oklahoma.

Education: Graduated from Charles Page High School, Sand Springs, Oklahoma, in May, 1972; received the Bachelor of Science in Home Economics degree in Food, Nutrition and Institution Administration from Oklahoma State University in 1976; completed requirements for the Master of Science degree at Oklahoma State University in December, 1979.

Professional Experience: Assistant to the Home Economist, Kerr Glass Corporation, summers of 1974 and 1975; Dietetic Technician, Oklahoma Osteopathic Hospital, summer of 1976; Dietitian, Franklin Memorial Hospital, 1977; currently employed as Consultant Dietitian for the Trinity Association of Southwest Kansas.

Professional Organizations: Associate Member of the American Dietetic Association.