THE IMPACT OF NUTRITION EDUCATION ON DIABETIC PATIENTS

By

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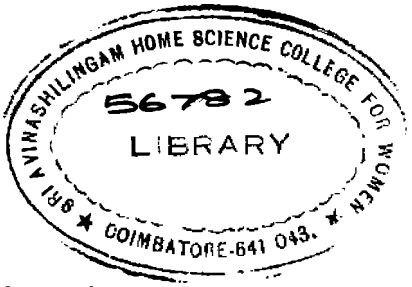

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I. INTRODUCTION

I. INTRODUCTION

Diabetes mellitus is a universal health problem, affecting human societies at all stages of development. Atleast 30 million people are involved throughout the world and the number of cases reported are increasing rapidly, with the aging of populations, changes in life style and improvement in ascertainment (WHO Expert Committee, 1980 Second Report).

Diabetes mellitus is a syndrome characterised by a raised glucose concentration in the blood, due to deficiency or diminished effectiveness of insulin (Davidson et al. 1975).

In India epidemiological studies show a predominance on the male with a sex ratio of 2.2:1.8 and a greater prevalence in the urban area (Ahuja, 1979).

Diabetes is no longer a minor cause of social suffering and economic loss in India. Of the estimated 30 millions of the overt diabetics in the world, 5 millions are in India. A large number of hospital patients come from poor and very poor economic strata (Samal, 1982 and Tripathy, 1982).

Manifestation may appear in youth, referred to as juvenile-onset type or in later life, as maturity - onset type. The clinical syndrome is characterised by

(1) an impaired ability to metabolise carbohydrates; (2) an increased concentration of glucose in the circulating blood (hyper glycaemia) and (3) the excretion of varying amounts of glucose in the urine (glycosuria). The secondary attendant symptoms are polydipsia, polyuria, failing strength and loss of weight. Pruritus vulvae, skin infections or irritation and visual disturbances are frequently present (Krause, 1972).

The high risk individuals include (1) those who are blood relatives of diabetics; (2) those over 40 years of age; (3) those who are obese; (4) women who have some carbohydrate intolerance during pregnancy and (5) women who give birth to babies weighing 9 pounds or more (Robinson, 1977).

The goal of therapy in diabetes mellitus is to maintain and prolong a healthy, productive, satisfying life. The programme is built on the 3 corner stones of the therapy for diabetes: drugs, diet and exercise. But the fourth corner stone is added: education. Education is as essential in diabetes as drugs, diet and exercise since these measures will be useless, unless the patient has received adequate and comprehensible instruction (Bajaj, 1977).

According to Krall (1978), education of the diabetic is not an addition to treatment, it is treatment. Without it the patient is unable to handle the treatment

tools that are his ultimate salvation.

Extensive surveys show that a large number of diabetics are not on modified diets and many more do not follow the diet they have been given. According to the bulletin issued by the British Diabetic Association (1982) the diabetics in the Western Countries have been eating the wrong foods.

The diabetic patient who follows a properly prescribed diet, coordinated with medication, may lead a well and productive life. Education is of great importance. He must understand his disease and his diet. The more the diabetic knows of his disease and how to overcome the metabolic derangements, the better he will be both now and in the future (Sajaj, 1977). Approximately 40 per cent of the new cases of diabetes can be controlled by diet alone (Davidson et al. 1978). Hence the advice on diet should be given as soon as the patient has been diagnosed.

According to the American Dietetic Association (1978) as quoted by Light (1979), Nutrition education is the process by which beliefs, attitudes, environmental influences and understandings about food, lead to practices that are scientifically sound, practical and consistent with individual needs and available food resources. The aim of nutrition education is to change

the behaviour of the learners who have misconceptions regarding their disease and diet (Angove, 1979). It is the foundation on which any programme for nutritional improvement can be built. It brings about changes from undesirable to desirable food and health habits.

Many studies and surveys undertaken in British and the USA have confirmed the great importance of adequate education of diabetic patients and their families (Pennow, et al. 1978).

Studies conducted at St. Vincent's Hospital, Melbourne in 1976 showed that the knowledge of diabetes mellitus was poor in the treatment group, as 40 per cent could not answer the question "What is diabetes?" (Kitchen, 1980).

Constant teaching and evaluation of dietary management is important to assist the individual patient to attain the best possible health. A better educated, better managed diabetic is expected to have better diabetic control (Graber, 1977).

According to Joslin (1976), all things being equal, the diabetic who knows the most about his disease lives the longest. This means that education is the foundation stone on which the control of diabetes depends and we can go a step further and say that without clear and proper instructions, the medical treatment of diabetes may not be effective (Menon, 1982).

The vast population in the under developed countries being illiterate and backward and with the limited communication media they are exposed to, the need for nutrition education becomes more important(Menon, 1982).

The present study was undertaken with the following objectives:

1) To elicit the knowledge of the diabetics regarding diabetes and diets

2) To impart nutrition education and

3) To evaluate the knowledge acquired by the diabetics after imparting nutrition education.

II. REVIEW OF LITERATURE

II. REVIEW OF LITERATURE

The literature available is discussed under the following headings:

1. Prevalence and incidence
2. Types of diabetes
3. Predisposing factors
   a) Genetic
   b) Obesity
   c) Viral factor
   d) Stress
   e) Alcohol
   f) Infectious disease
   g) Smoking
   h) Fiber depleted food
4. Nutrition and aetiology
5. Risk factors
6. Symptoms
7. Management of diabetes
   a) Insulin
   b) Oral hypoglycemic agents
   c) Exercise
   d) Diet
8. Knowledge of the diabetics
9. Importance of nutrition education

1. Prevalence and Incidence:

Diabetes mellitus is a universal health problem affecting human societies at all stages of development. Atleast 30 million people are involved throughout the world and the number of cases reported are increasing rapidly with the aging of populations, changes in life style and improvement in ascertainment (WHO Expert Committee, 1980).

Diabetes mellitus is a disorder characterised by hyperglycaemia, a relative or absolute deficiency of insulin and by certain characteristic symptoms and pathologic manifestations (West et al, 1976).

According to WHO Expert Committee, 1980 Diabetes mellitus is a state of chronic hyperglycaemia which may result from environmental and genetic factors, often acting jointly.

The prevalence of diabetes mellitus varies greatly among countries and populations. About 6% of all adults have diabetes (including both diagnosed and undiscovered cases), the prevalence rising to about 16% in those aged 65 and over (both known and occult). Diabetes is a common problem in every affluent society. Although rates are thought to be lower in the developing countries,

ascertainment is often difficult, it appears, however, that the disease is becoming an increasingly significant problem. In urban areas particularly, diabetes rates tend to be moderate to high in Asia, Africa and Latin America (WHO Expert Committee, 1980).

In India, the prospective epidemiological studies employing screening of the two sexes have shown a male predominance-male: female ratio 2.6:1.8(urban) and 1.5: 1.3 (rural). Prevalence of diabetes in urban areas is 2.1% while in rural it is 1.5%. Diabetes mellitus is an important health problem in India with an overall prevalence of 1.8% (Ahuja, 1979).

In most industrially advanced societies, the incidence of diabetes gradually rises during adult life (Falconer et al. 1971).

Both incidence and prevalence are usually highest in old age. However these typical relationship may be altered by environmental circumstances. In very corpulent populations incidence is considerably higher in the fourth and fifth decades than in the elderly. In insulin dependent cases, these peaks of incidence are of particular importance, occuring at 10-13 years of age (WHO Expert Committee, 1980).

In societies in which the food supply is not limited, diabetes is usually somewhat more common in women

than in men. In a few societies particularly in South-East Asia an excess of male diabetics has been observed (Malins et al. 1965).

The incidence of diabetes is increased about four fold in persons with moderate obesity. The risk of obesity is related to the duration as well as the degree of obesity (Westlund et al. 1972).

2. Types of diabetes

According to Skillman (1979) and Morrison (1981), diabetes mellitus may be classified into two major clinical types - insulin dependent diabetes and non-insulin dependent diabetes. The insulin dependent type, is the growth onset diabetes, occurs relatively infrequently and as a rule, is seen prior to age 30 but occassionally it occurs upto age 40. The onset is usually acute, the abnormality of carbohydrate metabolism is severe and insulin production is minimal or lacking. The non-insulin dependent diabetes occurs primarily after 30 years but has its highest incidence in the fifties and sixties. The onset is insidious and often does not present any of the chronic symptoms.

3. Pre-disposing Factors:

Any serious disturbance of the pancreas that interferes with the production and balance of insulin and glucagon predisposes a person to have clinical manifestation

of diabetes. There are several factors to consider (Krause, 1979).

a) Genetic factors:- It is now proposed that the diabetic predisposition is due to a number of genetic characteristics that result in the final clinical presentation. The disease probably occurs in families with an obesity sensitive genetic susceptibility to diabetes (Pirart, 1968; Bloom, 1967; Kent, 1976; Krause, 1979 and WHO Expert Committee, 1980). In maturity onset diabetes, inheretance is a strong determinant (Tattersall, 1972).

b) Obesity:- Obesity is frequently associated with hyper insulinism and there are suggestions of a reduced tissue sensitivity to insulin. Obesity is apparently not a factor in the aetiology of juvenile onset diabetes (Kay, 1974; Wahlquist et al. 1979; and Morrison et al. 1980).

Excessive energy intake and concomitant obesity (body weight greater than ideal by 20% or more) are also determinants (Cahill, 1978; Gray, 1979; and Keen et al. 1979). With every 20 percent increase in body weight, the chance of becoming diabetic doubles (Podolsky et al. 1980).

Obesity seems to increase resistance to insulin (Olefsky, 1974 and Kay et al. 1974). Therefore, avoidance of obesity in families or ethnic groups with a genetic

pre-disposition to maturity onset diabetes, is of considerable importance from a preventive point of view (Wahlquist et al. 1979).

c) Viral factors:- There is strong epidemiological evidence to suggest a connection with juvenile onset diabetes. It is thought that the susceptibility to pancreatic damage resulting from viral infection has a genetic link (Waugh, 1976).

d) Stress:- The ramifications of stress in the development of diabetes are poorly understood. Mental stress may aggravate the disease by causing the release of catecholamines which decreases glucose tolerance and promotes mobilization of fatty acids and possible keto acidosis accidents help to precipitate the symptoms of diabetes (Davidson et al. 1978; Krause, 1979).

e) Infectious diseases:- Infectious diseases such as influenza, pneumonia and scarlet fever, diseases of liver, gall bladder, thyroid, pituitary and pancreatic glands are frequently associated with diabetes (Slawson et al. 1963).

f) Alcohol:- Wahlquist et al. (1979) say that alcohol may be an aetiological dietary factor in diabetes mellitus through excessive energy intake, hepatic cirrhosis or the development of haemochromatosis.

Sinha (1981) stresses that the diabetics should avoid consumption of alcohol completely. Insulin may aggravate the intoxicating effect which in turn stimulates appetite and the whole chain reaction makes the diabetic prone to breaking dietary regulations and control of diabetes will be extremely difficult.

g) Smoking:- Sinha (1981) states that, the recent findings of professor Victor Lyneon have shown that in the case of diabetics the ill-effect of smoking is doubled compared to non-diabetics, since they are more prone to diseases of arteries and the circulation in legs and heart will be affected considerably.

h) Fibre depleted diets:- The relationship between fiber and the prevalence of diabetes was noted by Trowell (1978) who observed that rural Africans consuming high carbohydrate, high fibre diets rarely developed diabetes. This and comparable observations led to the hypothesis that fibre depleted diets play a role in the aetiology of diabetes.

The relationship between fibre depleted diets and diabetes was strengthened when two groups reported that fibre intake had a favourable impact on the glucose metabolism of diabetic patients (Jenkins et al. 1976).

4. Nutrition and Aetiology:

It has long been suspected that nutritional factors affect the risk of diabetes. More recent investigations elucidate further the nature and strength of these relationships. Changing dietary patterns in Japan(Tsuji et al. 1971) Israel (Cohen et al. 1972) and Africa(Cleave et al. 1974), have been associated with a profound increase in the rates of diabetes.

Studies by West et al. (1971) and other collaborators in 13 societies of 11 countries indicated a strong relationship of diabetes prevalence and nutritional factors (West et al. 1974).

The factor moststrongly and consistently associated with prevalence of adult onset diabetes is a degree and the duration of adiposity. Arguments have also been advanced that dietary sugar (Cohen et al. 1972 and Cleave et al. 1974) and fat are especially diabetogenic. Gerritsen et al. (1974) say that a review of all available laboratory and epidemiologic evidence suggests that the most important dietary factors in increasing the risk of diabetes is total caloric intake irrespective of the source.

5. Risk Factors:

According to Kent (1976), diabetic patients are 25 times more likely to go blind than non diabetics, 17 times more prone than non-diabetics to kidney disease and more than 5 times more prone to gangrene and twice as prone to heart disease, than non-diabetics and the

disease is now the leading cause of newly developed blindness in the United States. Sorsby (1973) and Podolsky et al. (1980) are also of the opinion that to the diabetic patient blindness is the most serious complication of his disease. When diabetes and its complications are considered together, diabetes is the third leading cause of death from disease in the United States and this figure is constantly rising as more and more fatalities are linked to the disease.

The relative risk of coronary heart disease in maturity onset diabetes mellitus is more marked in women than in men (Palumbo, 1979).

Vascular disease is by far the most common cause of death in adult diabetics (Soudek, 1982). Breveman (1971) states that it is a fact that over 30% of diabetics develop associated cutaneous problems. Upto 20% of diabetics may present initially with cutaneous infections (Lister, 1981).

Mortality in patients with poor control was found to be 2.3 times as frequent as that of patients with better control (Kressler, 1979). The competent control of diabetes is also assuming increasing importance as the development of associated above mentioned complications becomes more firmly established (Donald, 1971).

6. Symptoms

The classic symptoms of diabetes are polyuria (frequent urination and an abnormally large volume of urine), polydipsia (excessive thirst), polyphagia (increased appetite), loss of weight and ketosis is sometimes the abnormality that brings the patient to the physician (Robinson, 1977). Inability of tissues to heal and degenerative changes occur and failing strength are the symptoms (Krause, 1972). A new sign of diabetic autonomic neuropathy is found to be facial sweating during eating, which has been observed for the first time in a group of diabetics (Watkins, 1973).

7. Management of Diabetes

At one extreme of severity the life of the recently diagnosed diabetic depends upon regular injections of insulin and a regular life style. At the other extreme weight reduction by dietary restriction may suffice to correct the metabolic disturbance completely. Each situation will require its own individual management plan (WHO Expert Committee, 1980).

Living with a chronic disease such as diabetes mellitus requires personal knowledge of the nature of the disease, as well as acquisition of specific skills for self care in its management (Prater, 1974).

a) Insulin:- According to Krause (1979), the diabetic, frequently has to resort to commercial insulin preparations, he must inject a fixed amount of the harmone into his body each day. Because the amount of the daily injection is fixed and constant, he cannot have the same freedom in the intake of food as the non diabetic. A balance must be maintained between the insulin and the glucose received from food. The type, dosage and frequency of insulin administration is individualised for the patient depending upon his stage of growth, physical state, activity and psychological stability.

b) Oral hypoglycaemic agents:- In carefully selected patients in whom an adequate but unsuccessful trial of treatment with diet has been made, oral hypoglycaemic agents may provide good chemical control of diabetes over a period of years with a minimum of inconvenience to the patient. If effective, they are particularly helpful in patients with poor vision, with crippling arthritis of the fingers, with tremor of the hands and in those who refuse to take insulin(Marble, 1977).

c) Exercise:- Beneficial results of the exercise in controlled diabetes have been confirmed, in view of higher oxidative metabolism during intermittent exercise

program in the management of maturity onset diabetes (Mangia et al. 1980).

Koivisto (1981) indicates that regular, moderate exercise by elderly diabetics may mean improved metabolic control, reduced plasma insulin levels and a lower risk of coronary heart disease; Shah et al (1982) stress that it is important that the diabetic patient integrates an exercise programme into his daily activities in much the same way as diet and drugs.

d) Diet:- According to Brownlee (1979) and Danowski (1982) diet is the cornerstone of therapy for all types of diabetes.

In 1971, the university group diabetic programme (UGDP) reported the results of the multicenter study and concluded that 'diet alone' may be more effective in prolonging the life of the diabetic than the other therapeutic agents. In addition in 1975, the National Commission on Diabetes noted that the chance of diabetes mellitus doubles for every 20% of excessive weight. Hence the strong implication that 'diet' may play a role on the pathogenesis of diabetes mellitus (Arky, 1978).

According to Jackson (1982), the single most

effective treatment for noninsulin - dependent diabetes is control of food intake in order to achieve and to maintain ideal body weight.

The decision to treat affected persons by diet alone depends on the severity of symptoms the patients' age and weight. Older patients with mild diabetes due to obesity and no ketosis are invariably treated with diet to reduce their weight (Martin, 1976).

Flood (1979) states that optimal control of any stage of diabetes is possible only with optimal dietary management. Maintenance of dietary control would seem to be the best means of slowing and halting the progression of stable diabetes.

Palumbo (1977) states that the diet is the first line of treatment, followed by insulin or an oral hypoglycemic agent as necessary to control hyperglycemia or symptoms or both.

The importance of diet in the treatment of diabetes is known and emphasised to all. It is important that a diabetic patient integrates an exercise programme into his daily activities in much the same way as diet and drugs. Diet and exercise demand an equal important emphasis along with drugs if and when required in the management of all types of diabetes(Shah et al. 1982).

For too long the dietary management of diabetes has concentrated almost entirely on carbohydrate and that without distinction between refined and unrefined. An adequate intake of all nutrients must be ensured. For maturity onset diabetes energy balance is the first priority. The aims of nutritional advice for diabetics are as follows :-

1. Maintain ideal body weight
2. Maintain or improve glucose tolerance
3. Maintain as near as practicable euglycaemia
4. Maintain normal cholesterol, triglycerides and high density lipoprotein levels
5. Ensure an adequate intake of all nutrients
6. Allow ample physical activity

and 7. Consider the social function of food (Wahlquist et al. 1979).

According to Thomas (1980), there is no argument over the fact thatdiet is an important aspect of the treatment of diabetes mellitus. Some diabetics can be successfully managed by dietary measures alone, while these requiring insulin or oral hypoglycaemic agents are dependent upon dietary advice to prevent the unpleasant consequences of rapid swings in blood sugar.

Martin (1976) states that diets are to be designed to keep the urine and blood sugar as near to normal as possible.

According to Rowlands (1979), the calorie allowance should be distributed into 60% carbohydrates, 15% protein and 25% fat.

Simpson et al (1981) state that a high carbohydrate leguminous fibre diet improves all aspects of diabetic control.

Experience with the high carbohydrate high protein diet showed that the diet helped in achieving rapid and effective control of diabetes (Viswanathan et al. 1978).

Dietary fibres have been used successfully to treat diabetes (Jenkins et al. 1978), with a reduction of the doses of insulin or hypoglycaemic drugs. Gerritsen et al. (1974) state that diet not only helps to control diabetes but also reduces the severity of the diseases.

8. Knowledge of the Diabetics:

Surveys show that many persons with diabetes are not on modified diets and many more do not follow the diets they have been given. In a number of instances, instruction has been inadequate or the individual's dietary pattern has not been considered (Jernigan, 1969).

Kirkham (1980) with the studies conducted with 80 participants attending the review clinic at St. Vincents

hospital reports that the knowledge of diabetes mellitus was poor in the treatment group as 40% could not answer the question 'what is diabetes?' The significance of a high blood sugar level was understood by 56% of all patients. The significance of a low blood sugar was not understood by 40% insulin dependent patients. This lack of knowledge leaves the insulin dependent patients at serious risk of failing to recognise and cope with hypoglycaemic reactions.

Constant evaluation of dietary management is important to assist the individual patient to attain the best possible health. A better educated, better managed, more motivated person with diabetes should be expected to have better diabetic control (Graber, 1971).

Using questions from the diabetes supplement of National Health Survey an estimate was made of the extent to which persons with diabetes use and understand a diet based on the food exchange lists. The results indicated that about half of the respondents had received a diet which included exchanges, but thatonly approximately 25% of these could be considered to have good knowledge of their diet (Stulb, 1968).

Kaufman (1964), with the general impressions obtained from a small number of interviews agree with

those of many physicians, public health nurses and nutritionists says, that many persons with diabetes do not know enough to take adequate care of themselves. When the patient cannot tell his meal plan or if he does not know the difference between diabetic coma and insulin reaction, he cannot take care of himself in an emergency.

In the Warsaw study (1975), Czyrk has stated that the level of knowledge of the disease was found to be poor among 38% of patients studied.

According to Laron (1981), knowledge of the disease is so important for proper management. In a disease like diabetes, which is simultaneously acute and chronic in nature adequate knowledge of the disease is one of the main pillars on which control rests.

9. Importance of Nutrition for the Diabetics:

McNutt et al. (1980) define nutrition education as the process of imparting to the public the knowledge which is aimed to a general improvement of nutritional status through promotion of adequate food habits, elimination of unsatisfactory dietary practices, introduction of better food, hygiene, and more efficient use of food resources.

Giffe et al (1972) give the concept of nutrition education as the planned change, that is, a conscious effort to alter food related practices or attitudes.

According to WHO Expert Committee (1980), education is the corner-stone of diabetic therapy and vital to the integration of the diabetic into society and information mustbe repeated frequently to dispel misconceptions. It is important to emphasize the individual nature of the disease and its treatment and progression. Once the patient and his family have been assured that his life style need not be severely restricted he will more easily accept the discipline that diabetes imposes.

Kellock (1965) says that almost no other disease demands that a patient should for the rest of his life make medical observations on himself and adjust his own treatment.

Hassell (1973) states that there is a serious inadequacy in the area of satisfactory instructional programmes for the diabetic patients is found.

Living with a chronic disease such as diabetes mellitus, requires personal knowledge of the nature of the disease, as well as an acquisition of specific skills for self care in its management(Prater, 1974).

Stwadler (1972) has reported the need for more effective education among patients with diabetes and their families. Additional studies have demonstrated a lack of knowledge about the disease, as well as the methods of management among health professionals who work with diabetic patients.

Pamince et al. (1978) indicates that many studies and surveys undertaken in Britain and the USA have confirmed the great importance of adequate education of diabetic patients and their families.

By education we can make diabetic patients understand to keep his diet and drugs constant. By proper knowledge and edusation about his activity, necessary precaution can be taken at the time of need (Shah et al. 1982).

Joslin (1976) states that all things being equal, the diabetic who knows the most about his disease lives the longest. Menon (1982) explains this statement as that, the education is the foundation stone on which the control of diabetes depends and we can go a step further and say that without clear and proper instructi ns, the medical treatment of diabetes may not be effective. The vast population in the underdeveloped countries being illiterate and backward, the need for such education to be imparted to them is very urgent.

Joslin (1978) pinpoints that education is not an addition to treatment, it is treatment. Without it, the patient is unable to handle the treatment tools that are his ultimate salvation.

According to Bajaj (1977) the more the diabetic knows of his disease, diet and how to overcome the metabolic derangements, the better he will be both now and in the future. Obviously the diabetics themselves will be the ones towards whom much of the education is to be directed. Diabetics have the right to demand effective instruction, and the group concerned with this must ensure that diabetics receive the broad information which enables them to the greatest extent to control their disease. Advice on diet should be given as soon as possible after the diagnosis of diabetes has been reached.

Schneider (1982) states that nutritional counselling and education are recognised as key elements in educational programs designed for diabetic patients. The effectiveness of these programs is directly related to the ability to produce changes in patients' eating habits. The nutritional counsellor serves as a behavioural change-agent by completing a 3-part process for each individual. This involves assessing nutritional needs, constructing an appropriate meal plan, and providing initial and follow-up counselling.

III. METHODOLOGY

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The study on the Nutrition Education for the Diabetics consisted of the following steps:

1. Selection of samples
2. Eliciting the knowledge of the diabetics with regard to the diet and diabetes
3. Imparting nutrition education
4. Evaluating the effect of nutrition education

and 5. Analysing the data

1. Selection of Samples:

Diabetic patients, attending the diabetic clinic of the Coimbatore Medical College Hospital were selected for the study. Majority of the patients belonged to the economically and educationally backward group and came from urban slums or villages aroundCoimbatore. Hundred patients who were not exposed to nutrition education, were selected at random.

According to Gupta (1981), the simple random sampling refers to that sampling technique, in which each and every unit of the population has an equal opportunity of being selected in the sample. In simple random sampling,

the items that get selected in the sample is first a matter of choice and personal bias of the investigator does not influence the selection. A random sample represents the whole of the population and the analyst can easily assess the accuracy of this estimate because sampling errors follow the principle of chance.

Because of these reasons, the investigator adopted simple random sampling technique for selecting the samples.

The samples naturally included, both the sexes, juvenile and adult onset diabetic patients who were either insulin dependent or non insulin dependents.

2. Eliciting the Knowledge of the Diabetics Regarding Diet and Diabetes:

An interview schedule (Appendix I) was framed to elicit the knowledge of the diabetics regarding diet and diabetes. According to Rangaswamy (1976), interview schedule makes possible a face to face communication, inter-stimulation between the interviewer and the interviewee which helps in securing data not obtainable by methods that do not involve interpersonal relationship. Since good response could be elicited, the investigator chose this method for conducting the survey.

An interview schedule was prepared so as to collect general background information of the patient like the name, age, sex, educational and economical background and to check his existing knowledge about the disease, dietary management, facilities available for a diabetic, food fads and fallacies that are common among the diabetics. A 24 hour recall dietary survey was administered to find out the intake.

3. Imparting Nutrition education:

The nutrition education programme was planned based on the knowledge of the diabetics, with an idea of beginning where their knowledge ended. Nutrition education was imparted in a class room situation in the hospital itself. On five consecutive Thursdays, classes on diet and diabetes were conducted. Sally (1974) says that advantages of group situation for nutrition education as (a) it is much easier to change ideals and attitudes through a group than in an individual; (b) the security of belonging to a group gives the individual member a firm foundation from which they can put new ideas into practice.

The patients were given education on the following aspects:

a) What is diabetes?

b) Who gets diabetes?

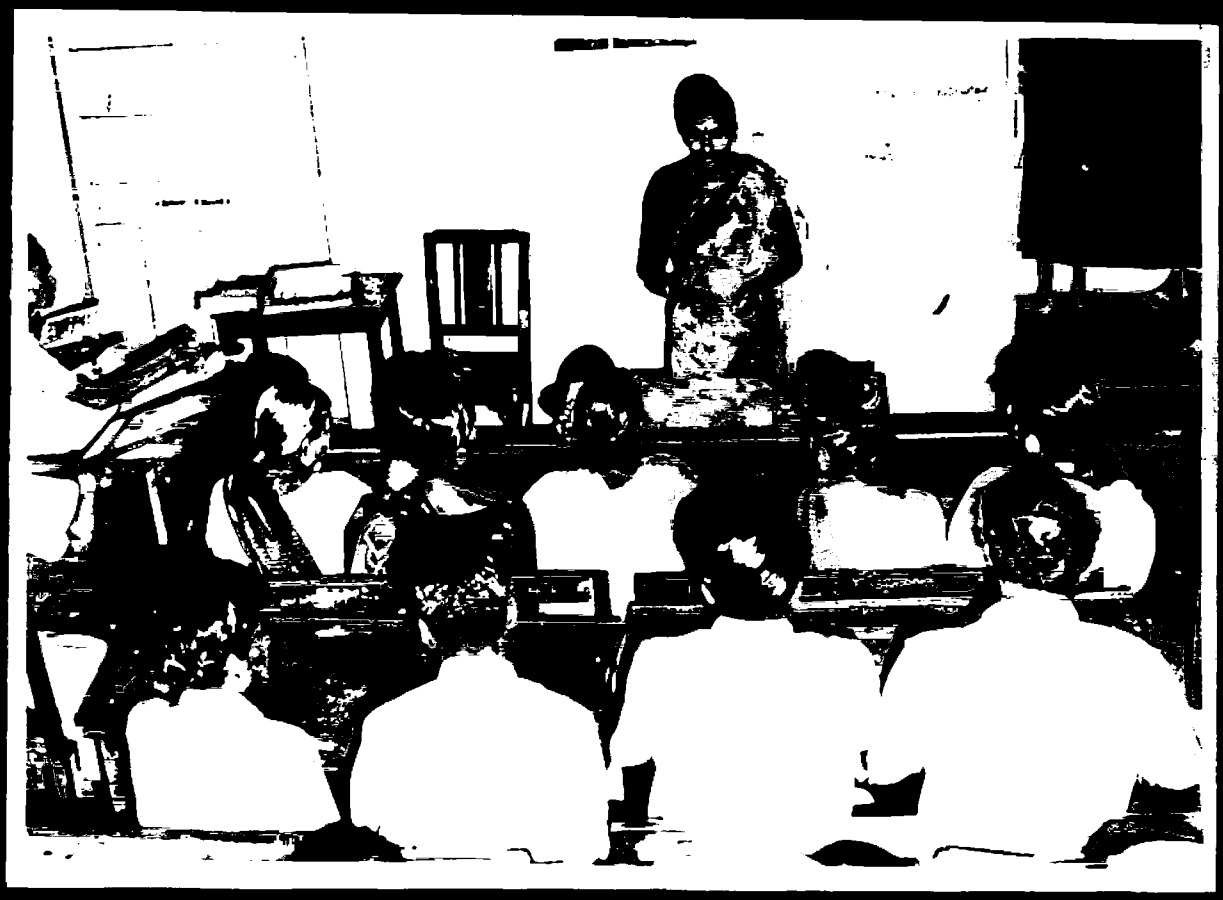


FIGURE 1: NUTRITION EDUCATION BEING IMPARTED IN A CLASS ROOM SITUATION

FIGURE 2: INDICATING THE AMOUNTS OF RAW INGREDIENTS TO BE USED - A PART OF NUTRITION EDUCATION

c) Risk factors

d) The role of diet in the treatment of diabetes

e) Management by diet with a calculated meal plan

f) Food and calories

g) Role of high fibre foods and raw vegetables

h) Exercise for diabetics

i) Smoking, alcohol and diabetes

In each education session, a day's menu for a 1000, 1300, 1800 and 2000 calories diabetic diets were prepared and exhibited (Sivaji, 1979). The raw ingredients required for these diets were also exhibited side by side for the patients to have an idea of the raw foods to be used. Charts were also made to explain these different caloric diets, foods to be avoided and foods that can be eaten unlimited (Appendix II). Time for discussions and clarifications was given at the end of each class.

Attendance was maintained to evaluate regularity and knowledge obtained.

4. Evaluating the Effect of Nutrition Education

The impact of the nutrition education was brought out with the help of another interview schedule (Appendix III) framed. This was based on the nutrition education given and by the questions and doubts raised by some of the patients.

5. Analysing the Data:

The data collected was consolidated, tabulated and analysed.

IV. RESULTS AND DISCUSSION

IV. RESULTS AND DISCUSSION

The 100 subjects treated at the Coimbatore Medical College Hospital selected by random sampling method fall in the age group of 10 - 80 years, as shown in the table below.

TABLE I

PERCENTAGE DISTRIBUTION OF DIABETICS ACCORDING TO AGE

Age (Years)	Percentage of Patients
9 - 25	15
26 - 40	19
41 - 55	44
56 - 70	18
71 - 80	4

The major percentage of the subjects were found to be in the age between 41 and 55 years. Shankar (1968) in his study conducted in Hubli found that the incidence of diabetes is maximum in the age group 40 - 59 years.

According to Robinson (1977), the maturity onset diabetic patients are not dependent upon insulin and can

be controlled by diet alone or by diet and one of the oral hypoglycaemic agents. Among the patients studied, no patient was under diet control alone. 93 per cent were takin insulin and 7 per cent were under oral hypoglycaemic agents, because the doctors put the patient on insulin without taking time to study the effect of diet and sulfonylurea.

1. Educational Status:

The educational background data obtained is tabulated below:

TABLE II

EDUCATIONAL BACKGROUND OF THE GROUP STUDIED

Educational background	Percentage of patients
Illiterates	47
Elementary School	23
High School	27
College	3

The majority of the patients (47 per cent) were illiterates and were not exposed to any educational

material for diabetics.

2. Economic Status:

Fifty eight per cent of the subjects were dependents and were not included in any gainful employment, while the rest worked as coolies, cycle shop mechanics, drivers, weavers, and other activities. The economic status of the group studied is as follows.

TABLE III

ECONOMIC STATUS OF THE GROUP STUDIED

Economic status	Percentage of the patients detected
Rs. 30 - 150/month	7
Rs. 151 - 250/month	21
Rs. 251 - 350/month	14

3. Dietary Habits:

Thirty two per cent were vegetarians and the rest 68 per cent non-vegetarians. Among the non-vegetarians 27.2 per cent of them ate non-vegetarian foods only once a week. The remaining 40.8 per cent did not eat non-vegetarian foods because of the cost involved. This shows

that even those who call themselves non-vegetarians are actually vegetarians in their eating habit.

The age of detection of diabetes is as follows.

TABLE IV

AGE WHEN DIABETES WAS DETECTED

Age in years	Percent of patients
10 - 26	17
27 - 43	38
44 - 60	45

Forty five per cent of the patients were between 44 - 60 years when diabetes was initially detected implying that the major group is the adult onset type. The next large group of 38 per cent were between the age of 27 - 43. The juvenile diabetics were only 17 per cent.

None of the patients were given diet education before and they were not aware of the existence of a dietitian who would give them diet counselling.

Eighty nine per cent of the subjects did not take any alcoholic beverage while 11 per cent avoided this question.

4. Food intake:

The 24 hours diet recall revealed that the most common menu used is as follows - Breakfast items were Idli, Uppuma, Chapathi and Ragi Kali. The lunch items included rice, uppuma, chapathi with dhal, rasam, poriyal and greens. The dinner items were more or less the same as breakfast items. Eighteen per cent took no beverages like coffee and tea while the remaining 82 per cent took coffee or tea everyday. Fifty nine per cent took butter milk everyday. The snacking included puffed rice by 49 per cent and beaten rice by 37 per cent.

The average food intake of the subjects is tabulated.

TABLE V

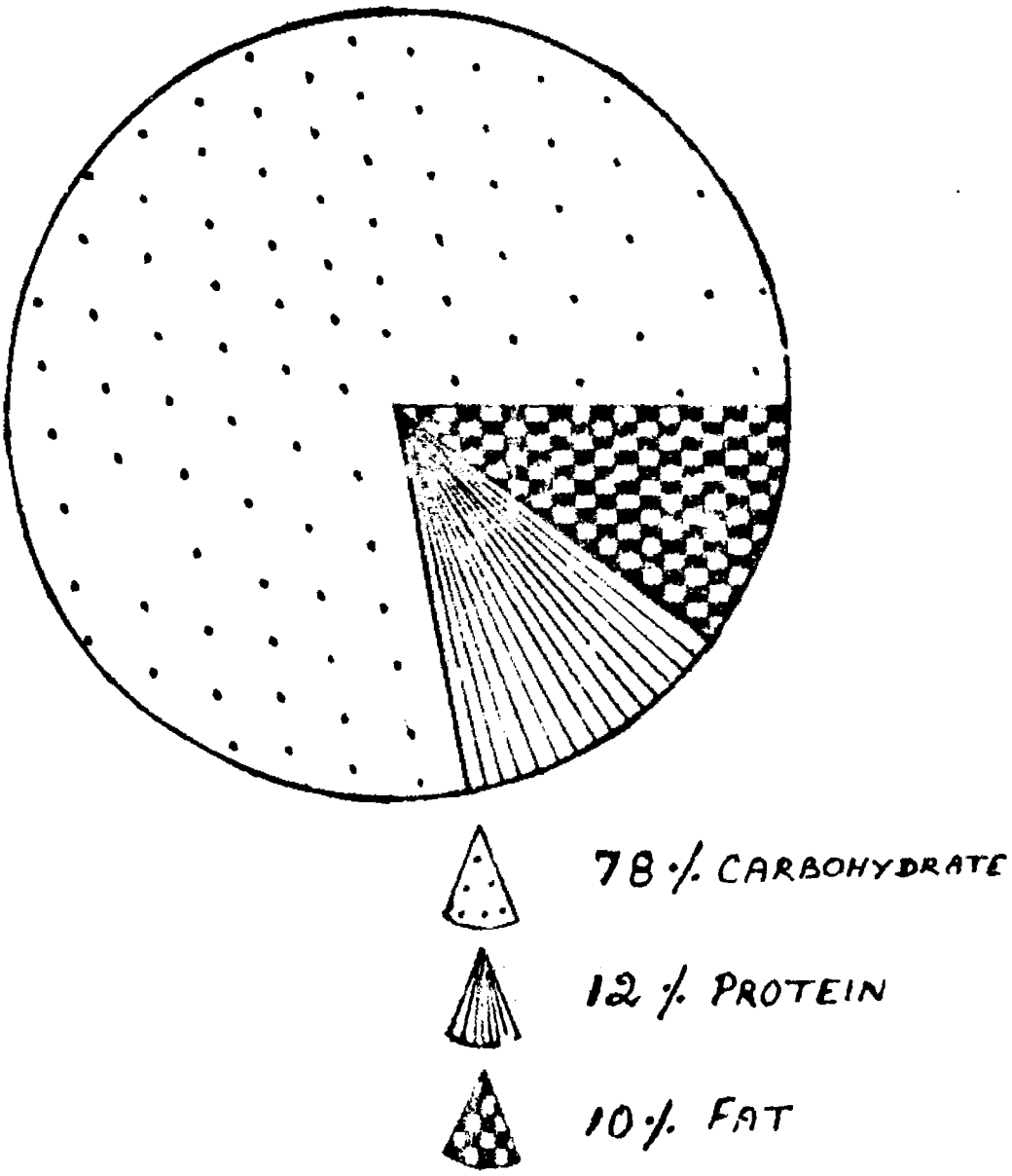
AVERAGE FOOD INTAKE PER DAY

Ingredients	Amount (g)	Protein (g)	Carbo-hydrate (g)	Fat (g)	Calories
Cereals:					
Rice	360	19.2	237.4	1.2	1038
Wheat	100	16.0	71.2	1.5	346
Pulses:					
Blakgram dhal	30	7.2	17.88	0.42	104
Redgram dhal	25	5.57	14.40	0.40	83
Vegetables:					
Drumstick	100	2.5	3.7	0.1	26.00
Greens	100	4.0	6.1	0.5	45.00
Onions	50	4.0	6.1	0.5	45.00
Milk	50 ml	3.6	2.2	2.08	33.50
Fats and Oils	15	—	—	15.00	135.00
Total		55.97	359.18	21.26	1841.00

The total caloric intake and the distribution of calories for protein, carbohydrate and fat is explained in the pie diagram.

FIGURE - 3

AVERAGE FOOD INTAKE PER DAY



The average total calories consumed was found to be 1040 per day. Carbohydrate contributed the bulk of the calories = 78 per cent, protein = 12 per cent and fat = 10 per cent. The earlier work done by Viswanathan showed that in the developing countries with a staple cereal food, the carbohydrate contributed 60 per cent of the total calories, protein = 15 per cent and fat = 25 per cent.

In a country like India where the bulk of the food consumed is only a staple cereal it is difficult to completely change the food habits. In a Western diabetic = the calorie distribution is usually 45 to 50 per cent carbohydrate, 15 = 25 per cent protein and 30 to 35 per cent fat (Krause, 1979). More and more studies now prove that a high carbohydrate diet is not harmful and even beneficial for a diabetic. The low fatintake in the Indian diabetic diet makes him less prone to atherosclerosis and other cardiovascular diseases (Cohen et al. 1972 and Cleave et al. 1974).

All the patients followed a three meal pattern. For 31 per cent the food was specially prepared at home while 69 per cent had the same food as the family had. None of the patients measured or weighed their food and they did not calculate their diets.

5. Exercise:

Six per cent of the diabetics selected were found to do the same exercise everyday and the rest 94 per cent did not do any exercise. Thirteen per cent of the patients said that the exercise helps to maintain the body weight and keep them brisk and 87 per centhad no idea whether exercise helps a diabetic or not. According to Abourisk (1982) the effect of exercise is so striking and so beneficial along with diet and insulin and should be accorded a definite and prominent place in the everyday treatment of diabetes.

6. Abnormal Meal Timings:

When the question 'what happens when the usual meal time is postponed?' was putforth, the answers were giddiness, excessive hunger, anger and others as shown in the following table.

TABLE VI

SYMPTOMS DUE TO ABNORMAL MEAL TIMES

Answers	Percentage of patients
Giddiness	40
Excessive hunger	36
Anger and others	16
No change	30

Among the 100 patients selected, 41 per cent said that they were not instructed by the doctor on the diet control and 59 per cent were instructed, but not clearly. None of the patients knew what a calorie is, and what the terms carbohydrate, protein, fat, starch and vitamins meant.

Only 32 per cent knew what hypoglycaemia is and they knew that they should take something sweet as a remedy. The others were not aware of the problem. None of the patients carried sugar or candy while going out.

7. Misconceptions Regarding Cereals

The question on the intake of cereals brought out the answers tabulated below.

TABLE VII

PERCENTAGE CONSUMPTION OF CEREALS

Cereals	Every day	Reasons
Rice	51%	Usage at home
Wheat	79%	Good for a diabetic
Ragi	83%	Good for a diabetic and easy availability

Ragi, wheat and rice were the cereals used by the diabetics. Eighty three per cent used ragi everyday, 79 per cent used wheat everyday and 51 per cent used rice everyday. Since the majority of the patients studied belonged to the low-income group, ragi is used in their homes by all the members whereas it was found that 79 per cent used wheat because they have been told that wheat is good for diabetics. Therefore, wheat rice or wheat uppuma was prepared for only the diabetic member of the family. In a rice eating South IndianCommunity, surprisingly only 51 per cent of them said thatthey eat rice every day. This is probably due to the propaganda of some of the hospitals and doctors who believe that wheat and ragi are superior to rice in maintaining the blood sugar. Ragi was found to be of no benefit in the treatment of diabetes mellitus in the study conducted by Patel (1965).

But 63 per cent of the patients said that ragi was good for diabetes and reduces the blood sugar level and 44 per cent said that wheat is good for diabetics.

A diabetic patient might follow a prescribed diet more easily if it is as close to his normal eating pattern. Substituting wheat for rice, in a regular rice eater might deter his following the diet over a long period.

8. Misconceptions Regarding Fruits and Roots and Tubers

Seventy five per cent of the patients had a wrong concept that the diabetics should not eat roots and tubers and therefore they did not eat. Only 24 per cent of the patients took roots and tubers once in a week. Green leafy vegetables were used by 54 per cent of the subjects almost everyday, and 46 per cent every week. Forty two per cent said that the green leafy vegetables are good for health while 65 per cent consumed green leafy vegetables because of the availability. Other vegetables were used by all the patients everyday, because of the daily usage at home.

Sixty three per cent of the patients had the wrong concept that they should never take fruits since they are sweet and they increase the blood sugar level. Only 22 per cent took fruits every day and 15 per cent once a week.

For specific question put on fruits 7 per cent of the subjects said that papaya was good for health. Sixty three per cent said that papaya increases sugar level since it is sweet and 30 per cent had no idea whether papaya could be eaten by the diabetics. Twenty nine per cent of the patients said that banana is good for health and it avoids constipation but 68 per cent

said that banana increases blood sugar level and 3 per cent had no idea regarding this question.

9. Knowledge on the Intake of [redacted] Foods

All the hundred patients replied that glucose and honey increase the blood sugar and should be avoided by the diabetics. All of them thought that bittergourd reduces blood sugar level since it is bitter.

Milk and milk products especially buttermilk was used by 83 per cent of the subjects, the reasons being good for health, daily usage at home and other reasons. Sugar and jaggery were avoided by all the hundred patients, the reason being they increase the blood sugar level.

When the question 'any foods that you do not eat' was asked the answers obtained are tabulated below.

TABLE VIII

FOODS AVOIDED AND THE REASONS

Reasons	Food items	Percentage of patients
Make you ill	Roots and tubers	3
	Oily foods	4
	Greens	4
	Ragi	11
	Sweet	1
Doctor's advice	Sweets	100
Dislike	Ragi	2

10. Urine testing:

Urine test for glucose was done by 80 per cent of the patients using Benedicts' method either at home or at hospital. The remaining 20 per cent of the subjects knew that there is a connection between the tested urine colour and the previous day's diet. Eleven per cent gave the reason that if any sweet was taken, the next day the urine colour was intensified and 19 per cent said if excess food was taken the urine colour was intensified the next day.

Apart from insulin and oral hypoglycaemic agents, bittergourd was considered to reduce the blood sugar level by 55 per cent of the patients, greens by 4 per cent gymnema sylvestre by 6 per cent, vinca rosea by 7 per cent the water from the wooden tumblers by 4 per cent and jamoon seed powder by 5 per cent of the subjects.

11. Knowledge of the Diabetics After Nutrition Education:

Out of the 100 patients included in the study, only 32 per cent came regularly for the Nutrition Education classes. After giving education for 5 weeks, another interview schedule was given to these 32 patients.

All the patients could say that Diabetes Mellitus is an inborn error of metabolism. All of them could answer to the question "who gets diabetes?". The answers are tabulated below.

TABLE IX

KNOWLEDGE OF INCIDENCE OF DIABETES

Who gets diabetes	Percentage of subjects who answered
Obese	100
Inherited	100
Some pregnant women	31.2
Under stress	22

Eighty one per cent of the patients who attended the classes could say that the hormone lacking in diabetes is insulin and only 19 per cent could not answer.

Four corner stones of treatment of diabetes were given by the patients are shown in the table.

TABLE NO X

KNOWLEDGE ON THE TREATMENT OF DIABETES

Corner Stones	Percentage of patients
Insulin	100
Diet	100
Oral Hypoglycaemic agents	31
Knowledge of the patients	72
Exercise	50

This shows thatthe patients have understood that diet plays an important role in controlling diabetes.

All the patients said that the diabetics were not allowed to take sugar and other sweets since they increase the blood sugar level.

The reason for the calorie restriction was not understood by 13 per cent of the subjects who attended the classes. 63 per cent said that calories were restricted

to maintain the body weight. Nine teen per cent said that the calories were restricted to regulate the diet and 19 per cent said that calories are restricted to keep the blood sugar level normal.

All the patients said that honey should not be taken by the diabetics instead of sugar. All the diabetics who attended the classes regularly said that any cereal could be taken by a diabetic but only the quantity mattered.

Fifty per cent of the patients could not cite examples for a carbohydrate rich food and the rest could give examples. Ninety seven per cent of the patients were sure that there is nofood that would reduce the blood sugar. Only 3 per cent said that bittergourd reduces blood sugar level. 94 per cent of the patients said that the diabetics could eat any vegetable but 6 per cent said that roots and tubers have tobe avoided by a diabetic.

Seventy eight per cent of the subjects knew how to test the urine. The rest 22 per cent did not know the procedure to test the urine. Every patient could say what they colours specify in the urine test and they understood that they could take the normal diet when the blue colour is obtained and a restricted diet when the other colours are noticed.

Sixty six per cent of the subjects understood the connection between the tested urine colour and the previous day's diet. The rest 34 per cent could not answer to this question.

Sixty six per cent of the subjects knew what diabetic coma is and the reasons - excess sugar in blood and the remedy for it.

Forty seven per cent knew what insulin shock is and the method of overcoming it. Fifty three per cent did not knew what happens when larger dosage of insulin is injected.

All the patients said that a diabetic should not take alcoholic beverages. Thirty eight per cent gave the reason for this that alcoholholic beverage adds extra calories alone with no other nutrient which a diabetic has to control and 38 per cent said that alcoholic beverage breaks the diabetic control over diet. Twenty four per cent did not know the reason why alcohol has to be avoided by a diabetic.

All the patients said that diabetics have to keep their feet dry and free from cracks to be safe from infectious diseases. The interview schedule was given to these 32 patients. The interview schedule included some specific questions to test the knowledge of the diabetics on this area. The answers given by these 32 patients were

scored once before giving the education and once again after giving them education for 5 weeks. The scores obtained are tabulated below.

TABLE XI

SCORES ON KNOWLEDGE OF THE DIABETICS BEFORE AND AFTER NUTRITION EDUCATION

Percentage of patients	Percentage Score	
	Before Education	After Education
47	10-25	
53	26-50	
50		50-75
50		76-100

According to Kuramanian (1981), importance of Nutrition Education for the diabetic, with a high illiteracy rate is increasing. Whatever is the teaching method, the printed materials may not be useful. Oral education with actual models and audio visual aids may be more useful. Each patient should be encouraged to participate in some group events to afford the opportunity to share the experience with others.

V. SUMMARY AND CONCLUSION

V. SUMMARY AND CONCLUSION

Among the 100 patients selected for the study on the impact of Nutrition Education on the diabetic patients, the major percentage fell in the age group of 41 - 55 years. The patients were educationally and economically backward. Among the 100 patients selected at random, the highest percentage of the patients (45 percent) belonged to the elderly adult onset diabetics in this group, 93 per cent of them were insulin dependents.

None of the patients selected were given nutrition education before and they were not aware of the existence of a dietitian who would be able to give them diet education.

The 24 hour dietary recall revealed that their average caloric consumption per day was 1840. This being contributed by 360 g. carbohydrate, 56 g. protein and 24 g. fat. This reveals that the major contribution of calories is from the carbohydrates. Most of the patients ate the food prepared for the family, and followed a 3 meal pattern None of the patients measured or weighed their food and they did not calculate their diets.

Eighty seven per cent of the patients were not aware of the beneficial effect of exercise.

Eighty per cent of the patients had a wrong concept that ragi and wheat are superior to rice in controlling the blood glucose. This is largely due to the false education given by their friends and relatives. Most of the patients were of the opinion that the roots and tubers should not be eaten by the diabetics, fruits should never be consumed since they increase the blood sugar level and bitter gourd and water from the wooden tumblers reduce the blood sugar level.

Only very few patients knew what hypoglycaemia was and the method of overcoming it. Only 28 per cent of the subjects were aware of the connection between the tested urine colour and the diet. This necessitated the need to include the aspect of urine testing in the education.

The attendance record maintained showed that only 32 per cent were regular for the five education classes. A second interview schedule was given to these 32 regular patients.

Eighty one per cent of the patients who attended the classes regularly could say that the harmone lacking in diabetes is insulin, all the patients realised that diet plays an important role in controlling diabetes and it is very important for a diabetic to learn about diet and diabetes to live with it successfully. Fifty per cent of the patients understood the importance of exercise and

the maintenance of the normal body weight, while before the education was given, eighty seven per cent of the patients did not know whether exercise helps a diabetic or not.

All the patients were aware of the reason for sugar restriction for the diabetic. Eighty seven per cent of the patients who attended the classes understood the need for restricting the calories for a diabetic. All the patients realised that any cereal could be eaten by the diabetic but only the quantity that mattered. Ninety seven per cent of the patients learnt that there is no food that would reduce the blood sugar and 94 per cent said that the diabetics could take any vegetable and there is no need to avoid the roots and tubers.

All the patients could indicate the significance of the colours in the urine test.

Sixty six per cent of the subjects knew what diabetic coma is, the reason and had to overcome this. Forty seven per cent knew the reason for insulin shock and the remedy for it. All the patients said that alcoholic beverages should not be taken by the diabetics because of the following reasons - alcohol adds extra calories which has to be restricted by a diabetic, it provides no other nutrients and it breaks the diet control of the diabetic. All the patients realised that they should keep their feet

clean, dry and free from cracks to be safe from the infectious diseases.

For the 32 patients who attended the classes regularly, the interview schedules before and after education were scored. Since questions were included to test the knowledge of the diabetics, the scoring helped to evaluate the impact of nutrition education. Before education 47 per cent of the patients could score only 10 - 25 per cent and 53 per cent of the patients 26 - 50 per cent. After the education, a considerable improvement was seen. Fifty per cent of the patients scored 50 - 75 per cent and other fifty per cent could score 75 - 100 per cent. This improvement shows that the diabetics when given proper and continuous education, can understand the facts regarding diet and diabetes and drop the misconceptions and lead a productive normal life like others.

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APPENDICES

APPENDIX – I

SRI AVINASHILINGAM HOME SCIENCE COLLEGE FOR WOMEN, COIMBATORE-43.

INTERVIEW SCHEDULE TO ELICIT THE KNOWLEDGE OF DIET THE DIABETICS, HAVE

Name of the investigator: Date:

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1. (a) Name: (c) Age:
   (b) Address: (d) Sex:
   (e) Height:
   (f) Weight:

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2. Physician's Name and Address: 3. (a) Educational Background
   (b) Occupation:
   (c) Income :
   (d) Veg/Non Veg :

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4. Are you taking Yes No
   (a) Insulin
   (b) Oral hypoglycaemic drugs
   (c) Neither of the above
5. When was diabetes detected
6. (a) Whether any diet education was given?
   (b) If so, what?
   (c) Who gave ?
   (the source)
7. (a) Do you know if there is a dietitian

(b) Do you feel she can render service to you

8. Do you take any alcoholic beverage

(a) Never

(b) Occassionally

(c) Regularly

9. (a) What kind of work do you do

(b) What are your usual working hours

Hours/day : Hours/Weeks :

(c) Describe any other regular work you do at home (or) elsewhere

(d) What are your usual leisure time activities

(a) Weekends :

(b) Holidays :

(c) Vacations :

10. (a) Do you do any exercise:

(b) Does it help a diabetic :
If so, how :

11. What foods do you choose for your usual meals and snacks (Include sugar, milk -- used in beverages, ghee, oil in dosai Idli, Sweet like jaggery syrup).

24 Hours Recall survey

Kinds of foods	Approximate amounts
MORNING	
Time :	

Place :

- -

NOON

Time :

Place :

- -

NIGHT

Time :

Place :

- -

Snacks

Time :

Place :

Time :

Place :

Time :

- -

12. Number of meals a day

13. Is food specially prepared for you (or) a part of the food prepared for the family?

14. (a) Have you ever measured/weighed your food?

(b) If not, how do you calculate and adjust your diet?

15. (a) What is likely to happen when you postpone eating in the usual time?

(b) Has this happened to you anytime?

16. What do you do when it gets late for a meal?

17. Do you use the following commercially prepared foods?

	Yes	No
(a) Puffed rice	( )	( )
(b) Beaten rice	( )	( )

(c) Sugar cane ( ) ( )

(d) Boiled tubers like sweet potato Others (specify) ( ) ( )

(e) Sweets like

(i) Kamarkut ( ) ( )

(ii) Sesame Balls ( ) ( )

(iii) Toffees ( ) ( )

Others(specify)

18. Check whether you eat the following food items.

FOODS	Everyday	Every week	Never	Reasons
Cereals				
Rice				
Wheat				
Maida				
Ragi				
Jowar				
Maize				
Pulses				
Redgram Dhal				
Black " "				
Bengal " "				
Horse " "				
Green " "				

FOODS	Everyday	Everyweek	Never	Reasons
Roots and Tubers				
Potato				
Carrot				
Yam				
Tapioca				
Colocasia				
Green leafy				
Vegetables				
Amaranth				
Others (specify)				
Other Vegetables				
Brinjal				
Beans				
Pumpkin				
Ladies finger				
Tomato				
Others(specify)				
F r uits				
Plantain				
Guava				
Papaya				
Others(specify)				
Nuts and oils				
Gingelly oil				
Groundnutoil				
Coconut oil				
Vanaspathy				
Others(specify)				

FOODS	Everyday	Everyweek	Never	Reasons
Fleshy foods				
Mutton				
Chicken				
Fish				
Egg				
Beef				
Others (specify)				
Milk and Milk Products				
Milk				
Curds				
Buttermilk				
Ghee				
Sugar and Jaggery				
Beverages				
Tea				
Coffee				
Others (specify)				

19. Name any foods listed above that you do not eat

(a) Can not eat :

(b) Dislike :

(c) Religious taboo :

(d) Make you ill :

(e) Doctor told you not to eat :

20. What foods would you find especially difficult to give up

21. (a) Has the doctor ever told you to follow a diet? Yes ( ) No ( )

(b) Are you still on this diet If so, describe : ( ) ( )

22. Do you know what is meant by the following give 2 examples of foods rich in each.

(a) Calories :

(b) Carbohydrate :

(c) Protein :

(d) Fat :

(e) Starch :

(f) Vitamins :

23. Which of the following cereals do you think is good for a diabetic

Rice/Wheat/Ragi/Cholam/Maize

Reasons :

24. Do you think a Diabetic can eat the following Reasons?

	Yes	No
(a) Papaya	( )	( )
(b) Banana	( )	( )
(c) Rice	( )	( )
(d) Glucose	( )	( )
(e) Honey	( )	( )
(f) Bitter gourd	( )	( )

25. (a) Do you know what is Hypoglycaemia :

(b) If so, do you know how to prevent and treat it when you come across?

(c) Do you carry sugar or candy with you :

26. (a) Do you test your urine often ?

(b) Do you test the urine at home/hospital?

(c) What method do you follow to test the urine ?

(d) The colour observed in the test as in the colourchart

Blue	———	Yellow or brown	———
Pea green	———	Brick red	———
Yellow green	———		

27. (a) Do you think that there is any connection between the urine colour and the previous day's diet?

(b) In what way?

28. Apart from insulin and oral hypoglycaimic agents do you take anythingelse to reduce the blood sugar level?

Investigator's Signature.

APPENDEX II

A. 1000 Calories Diabetic Diet.

Breakfast	Idli-1 or Dosai-1 or Uppuma-1/2 cup
8.00 am	Coffee or tea with 3/4 cup milk
	Banana-1.
Midmorning	Butter milk or lemon juice with salt.
10.00 am	
Lunch	Rice-3/4 cup or Chapathi -1
12-00 pm	Dhal-1/2 cup or Mutton/Fish/egg-50g.
	Sabre beans - 1/2 cup
	Sambar -1/2 cup
	Rasam -1/2 cup
	Curds -3/4 cup
Evening	Coffee or tea with 3/4 cup milk
4-00 pm	
Dinner	Rice-3/4 cup or Chapathi-1
8-00 pm	Orgens -1/2 cup
	Carpot -1/2 cup
	Rasam -1/2 cup
	Sambar -1/2 cup
	curds -3/4 cup
Bed time	Milk - 1 cup

The amount of oil allowed to use per day is 2 teaspoons

B. 1500 Calories Diabetic Diet

Breakfast	Idli-2 (or) Dosai-2 (or) Uppuma-1 cup
8.00 am	(or) bread-2 rices
	Tea-1 cup Banana-1
Midmorning	Buttermilk or lemon juice (with salt)
10-00 am	

Lunch	Rice-1½ cups or Chapathi-2 dhal-½ cup
12-00 pm	or (Mutton/Fish/egg - 50 g)
	Sabre beans - ½ cup
	Sambar - ½ cup
	Rasam - ½ cup
	Curds - 3/4 cup
Evening	Coffee with 3/4 cup milk
4-00 pm	Vadai -1
Dinner	Rice-1½ cups or Chapathi -2 dhal-½ cup
8-00 pm	or Mutton/fish/egg - 50 g.
	Greens -½ cups
	Carrot - ½ cup
	Rasam - ½ cup
	Curds -3/4 cup
Bed time	Milk - 1 cup

The amount of oil allowed for use per day -3 teaspoons

C. 1800 Calories Diabetic Diet

Morning. 6-00 am	Milk -1 cup without sugar
Breakfast	Uppama -1½ cups coorriander chutney-1/4cu
9-00 am	
Mid morning	Butter milk
10-30 am	
Lunch	Rice - 2¼ cups
12-00 pm	Dhal - 1 cup
	Buttergand poriyal -½ cup
	Carrot salad - ½ cup
	Curds - ½ cup

Evening	Green gram sundal = 3/4 cup coffee
4-00 pm	or tea with 3/4 cup milk.
Dinner	Ragai Adai -2 Greens masiyal -1/2 cup
8-00 pm	
Bed time	Milk -1 cup

The amount of oil allowed for use per day is 2 teaspoons.

D. 2000 Calories Diabetic Diet.

Breakfast	Idli-3 or Dosai-3 or Uppuma -1½ cups
8-00 am	or bread-3 slices coffee or tea with
	3/4 cup milk Banana-1
Midmorning	Buttermilk or lemon juice with salt
10-00 am	
Lunch	Rice -2½ cups or Chapathi-3
12-00 pm	Dhal-½ cup or Mutton/Fish/egg-50g.
	Sabra beans-½ cup
	Sambar - ½ cup
	Rasam -½ cup
	curds -3/4 cup
Evening	Coffee or tea with 3/4 cup milk
4-00 pm	Vadai -1
Dinner	Rice-2½ cups or Chapathi-3 Dhal-½ cup
8-00 pm	or Mutton/Fish/egg -50 g.
	Greens -½ cup
	Carrot -½ cup
	Sambar -½ cup
	Rasam -½ cup
	curds -3/4 cup

Bed time Milk -1 cup

Banana -1

The amount of oil allowed for use per day is teaspoons.

E. Foods Allowed without Restriction:

Lime Juice

Soda Water

Plain tea and coffee (without sugar)

Tomato Juice (without sugar)

Pepper water

Skimmed butter milk

Raw vegetable salad

Sour pickle without oil

F. Foods to be Avoided

Sugar

Honey

Glucose

Jaggary

Indian Sweets

Sweet Biscuits

Cakes

Preserved fruits

Alcoholic drinks

Aerated drinks

Horlicks

Bournvita

Dried fruits.

APPENDIX III

SRI AVINASHILINGAM HOME SCIENCE COLLEGE FOR WOMEN :: COIMBATORE.

INTERVIEW SCHEDULE TO ELICIT THE IMPACT OF

NUTRITION EDUCATION FOR THE

DIABETICS.

NAME OF THE INVESTIGATOR: DATE :

1. (a) NAME: (c) Sex :

(b) ADDRESS: (d) Educational background :

(e) Occupation :

2. Diabetes is an

(a) Infectious Disease ( )

(b) Inborn Error of metabolism ( )

3. Who gets Diabetes?

4. What are the symptoms of Diabetes?

5. What is the Hormone lacking in Diabetics?

6. What are the 4 corner stones in the treatment of Diabetes?

7. Why should diabetics not take sugar and other sweet foods?

8. Why are calories restricted for a Diabetic?

9. Can a Diabetic take Honey instead of Sugar?

10. Which of the following cereal is good for a Diabetic?

(A) Rice ( )

(B) Wheat ( )

(C) Ragi ( )

(D) Cholam ( )

Reasons:

11. Give 2 examples of the foods rich in Carbohydrate.

12. What are the foods that reduce Blood sugar?

13. What are the vegetables a Diabetic has to avoid?

14. How is urine tested?

15. What do these colours specify? How will you adjust your diet accordingly?

(a) Blue —

(b) Green —

(c) Yellow —

(d) Red —

(e) Brown —

16. (a) Do you think that there is any connection between the tested urine colour and the previous day's diet?

(b) In what way?

17. (a) What is Diabetic coma?

(b) What is the remedyfor Diabetic coma?

18. (a) What happens when larger dosage of insulin is given?

(b) What should you do when you come across insulin shock?

19. Can a Diabetic take alcoholic beverages?

Reasons:

20. Why should the Diabetics keep their feet dry and free from cracks?

Investigator Signature.