A DESCRIPTIVE STUDY ON THE PHYSICAL ACTIVITIES AMONG TYPE 2 DIABETES PATIENTS WITH CONTROLLED AND UNCONTROLLED BLOOD SUGAR IN A SELECTED HOSPITAL AT KOLLAM DISTRICT, KERALA.

BY

30083604

A DISSERTATION SUBMITTED TO THE TAMILNADU Dr.M.G.R. MEDICAL UNIVERSITY, CHENNAI, IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN NURSING

MARCH – 2010

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SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN NURSING FROM THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI.

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"I will instruct thee and teach thee in the way which thou shall go".

Psalms 32:8

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Introduction

CHAPTER – I

INTRODUCTION

Lack of activity destroys the good condition of every human being
while movement and methodical physical exercises
save it and preserve it. (Plato)

BACKGROUND OF THE STUDY

Accessibility to comfort and luxury, especially in developing countries such as India, it is increasingly easier to become physically inactive. Automobiles have become reasonably affordable to a large section of Indians, rendering them increasingly inactive. Owning a car has also become a status symbol that people are driving even very short distances like going to the market, park etc. Youngsters find it more fun to go for a drive than walking or other physical activities. Other technological innovations have also contributed to this inactivity such as use of lifts and escalators instead of stairs, playing computer games instead of outdoor games etc.

Lack of physical activity is a contributing factor in the rising prevalence of type 2 diabetes mellitus. Higher levels of physical activity, even of moderate intensity, are associated with a substantial reduction in risk of diabetes. Although physical activity is a treatment of diabetes, levels of it in adults with type 2 diabetes mellitus is low. The visible consequence of physical inactivity is weight gain, often related to a diet high in calories and fats. This in turn negatively affects an individual's metabolism with high cholesterol and sugar

levels, leading to obesity. Inactive individuals are also more prone to begin smoking, consuming alcohol and at times falling into the vicious circle of drug consumption.

At least 60% of the world's population fail to complete the recommended amount of physical activity required to induce health benefits. This is partly due to insufficient participation in physical activity during leisure time and an increase in sedentary behaviour during occupational and domestic activities. An increase in the use of "Passive" modes of transport has also been associated with declining physical activity levels.

The major component of energy expenditure is physical activity. Any movement of the whole body or even a small part of it, expends energy. The greater the movements, the greater the energy requirements. Individuals who have strenuous occupations in terms of physical exertion and those who exercise hard for extended periods, as in sports, have high caloric requirements. Although the metabolic response to exercise is influenced by numerous factors like nutrition, age, type of exercise and physical condition, the most important factors affecting fuel utilization are generally work intensity and duration.

In a person with normal metabolism, insulin is released from the beta (β) cells of the pancreas after eating ("postprandial"), and it signals insulin-sensitive tissues in the body to absorb glucose. This lowers blood glucose levels. The beta cells reduce their insulin output as blood glucose levels fall, with the result that blood glucose is maintained at approximately 5 mmol/L (90 mg/dL). In an insulin-resistant person, normal levels of insulin do not have the same effect on muscle and adipose cells, with the result that glucose levels stay higher than normal. To compensate for this, the pancreas in an insulin-resistant individual is stimulated to release more insulin. Insulin resistance can progress to Type 2 diabetes mellitus.

Type 2 diabetic patients have normal exercise-induced glucose uptake in skeletal muscle. Skeletal muscle is responsible for a major portion of the uptake of glucose in the postprandial state, mediated by an increase in circulating levels of insulin. Insulin binds to the insulin receptor expressed in muscle and ultimately leads to the translocation of a glucose transporter (GLUT4) to the plasma membrane, thereby facilitating glucose uptake. In the diabetic state, the muscle is resistant to the effects of insulin, or insulin production is

diminished, resulting in reduced muscular glucose uptake after a meal and therefore hyperglycemia.

Physical activity should be encouraged as part of a daily routine. While moderate physical activity for at least 30 minutes a day is preferable, intermittent physical activity also increases caloric expenditure and may be important for those who cannot fit 30 minutes of sustained activity into their daily schedules. For most persons, the greatest opportunity for physical activity is associated with leisure time, because few occupations today provide sufficient vigorous or moderate physical activity to produce health benefits.

Simple measures like daily and regular physical activity, maintaining optimum weight and cutting off extra calories with increased consumption of green vegetables and fruits are likely to be potentially beneficial in preventing diabetes not only among otherwise healthy people but also among those at high risk like over weight and obese people and those with impaired glucose tolerance. This is the most important and cost-effective method to reduce the huge cost burden of diabetes.

Exercise provides positive benefits for those who have diabetes. It can lower blood sugar levels, improve insulin sensitivity, and strengthen the heart. Strength training, which increases muscle and reduces fat, may be particularly helpful for people with diabetes.

Studies have shown that people with diabetes who have worked out for an average of 38 minutes per day lowered their blood pressure, cholesterol, and A1c levels (blood sugar concentration over time). After 2 years of such exercise, active patients were in better health and had lower medical expenses. Those who remained sedentary for that time period experienced a decline in their overall health, and had higher health care-related expenses. The active patients also had lower heart disease risk, even if they didn't lose weight. The average increase in patients' activity equaled about 2,200 extra steps a day.

Normally people are engaged in different types of physical activities such as activities of daily living, sexual activity, housework etc, apart from the exercise, leisure activities or occupation. These activities may burn the calories and the energy expenditure. In type 2 diabetes mellitus patients, such type of physical activities may help in the control of blood sugar. As the time spending on these activities increases, it increases the energy utilization and in the control of blood sugar. The speed and intensity of the activity and sweating during the activities also in turn helps in the control of blood sugar.

NEED OF THE STUDY

Diabetes mellitus is a global problem with devastating human, social and economic impact. Diabetes mellitus is the 4th leading cause of death in most developed countries. In 2005, diabetes affects 246 million people worldwide and is expected to affect 380 million by 2025 (a prevalence rate of about 5.4%). Today more than 250 million people worldwide are living with diabetes and each year another 7 million people develop diabetes.

In September 2006, the President-elect of the International Diabetes Federation, Prof. Martin Silink was widely quoted in the media as saying that “Diabetes is one of the biggest health catastrophes the world has ever seen”. According to Diabetes U.K, there are around 2.2 million people in the UK diagnosed with diabetes mellitus.

India leads the world with largest number of diabetic subjects earning the dubious destination of being termed “The Diabetes Capital of the World”. Independent WHO observers put the total no. of diabetics at 177 million; India tops the best of 10 countries, followed by China.

The International Diabetes Federation (IDF) 2007 estimates the total number of diabetic subjects to be around 409 million in India and this is further set to rise to 699 million by the year 2025.

In South India, Prof. Lefebure said, “The incidence of diabetes and impaired glucose tolerance had been increasing since 1984; about 3.2 million people die of diabetes across the world every year”.

It is also estimated that there are 30-33 million diabetics in India now and every 4th diabetic in the world today is an Indian. Among 35 million people of India, 1.1 million currently have diabetes. Projects suggest that in 20 years, over 75 million people will be infected. (BD Initiatives in India, 2007).

The prevalence of diabetes in Kerala is more than 17% and majority is above 60 years. The newly diagnosed diabetic patients are mostly in between the age group of 35-40 years. A very high prevalence of 19.5% was reported at Ernakulam in Kerala in the year 2006. The investigator found that there were approximately 20-30 diabetic patients attending everyday in OPD of Vijaya Hospital, Kottarakkara.

The cause of 1.9 million mortalities worldwide is lack of physical activities, which estimated 10 to 16% because of diabetes and 22% are because of heart ischemic diseases (American Diabetes Association, 1997). According to WHO, the prevalence of diabetes in Iran in 1995 and 2000 and 2025, respectively is 5.5, 5.7 and 6.8%. (King *et al*. 1998).Daily physical activities and healthy diets are playing an important role in prevention of diabetes mellitus; according to WHO report in 2002.

Up to 80% of type 2 diabetes is preventable by adopting a healthy diet and increasing physical activity. Type 2 diabetes has become the most frequent condition in people with kidney failure in countries of the Western world. 10% to 20% of people with diabetes die of renal failure. It is estimated that more than 2.5 million people worldwide are affected by diabetic retinopathy. On average, people with type 2 diabetes will die 5-10 years before people without diabetes, mostly due to cardiovascular disease. People with type 2 diabetes are over twice as likely to have a heart attack or stroke as people who do not have diabetes.

In Chennai urban population study, Pradeep et al (2000) found that people with diabetes were 25 times more prone to develop blindness, 10 times more to develop kidney disease, 30 times more to undergo a major amputation and twice as likely to suffer by stroke than individual without diabetes, prevalence of diabetes related complications were 21.4% for coronary heart disease, 17.5% for neuropathy, 19% for retinopathy and 6.3% for peripheral vascular disease.

Only 26 percent of U.S. adults engage in vigorous leisure-time physical activity three or more times per week. About 59 percent of adults do no vigorous physical activity at all in their leisure time. About 25 percent of young people participate in light-to-moderate activity (e.g., walking, bicycling) nearly every day. About 50 percent regularly engage in vigorous physical activity. Approximately 25 percent report no vigorous physical activity, and 14 percent report no recent vigorous or light-to-moderate physical activity. Up to 80% of Type 2 diabetes is preventable by adopting a healthy diet and increasing physical activity.

According to BHFNC- Physical Activity and Health Fact Sheet 2007, regular physical activity has a protective effect against developing type 2 diabetes mellitus, lowering the risk of developing non-insulin dependent diabetes mellitus by 33-50 %. Physical activity may also reduce the risk of developing type 2 diabetes mellitus in groups of people with impaired glucose tolerance (IGT).

Current recommendations for optimal physical activities are varied. The American Heart Association statement outlines any recreational or organized activity that generates energy expenditures above the resting level (ideally at least > 50-60 % maximal exertion) 4-5 times per week. The NHBPEP recommends regular aerobic activity of 30- 60 minutes per day on most days and limiting sedentary activities to < 2 hrs per day.

The Finnish Diabetes Prevention Study (2003) found that for every 22 people with impaired glucose tolerance who received a nutritional counseling and exercise advice intervention, one case of diabetes could be prevented. Physical activity of a moderate and vigorous intensity and duration is associated with decreased risk of conversion of IGT into diabetes, even in the absence of weight loss and independently of other identified risk factors. Regular physical activity can produce small but significant improvements in blood glucose control in people with type 2 diabetes mellitus.

In the Da Qing IGT and Diabetes Study (1997), 577 people with IGT from 33 clinics were randomized, by clinic, to diet only, exercise only, diet plus exercise, or control. After 6 years of follow-up, cumulative incidence of type 2 diabetes was 68% in control, 44% in diet only, 41% in exercise only, and 46% in diet plus exercise groups. This study provides evidence that both diet and exercise can be effective diabetes prevention modalities.

In the Malmo study (1991), a nonrandomized trial, 161 people with IGT who participated in a diet-and-exercise intervention were compared after 6 years with 56 individuals with IGT who were offered the same intervention and declined. The cumulative 6-year incidence of type 2 diabetes was 11% in the intervention group and 21% in the control group.

A recent Meta analysis systematically reviewed the effect of physical activity interventions from 14 controlled trials involving a total population of 250 patients to quantify the effect of regular physical training on glycemic control in adults with type 2 diabetes. The finding suggests that regular physical activity reduces HbA1c by approximately 0.66 percentage points compared to controls. A reduction in HbA1c has a clinical significance, particularly in the light of UK Prospective Diabetes Study Group findings that 0.9% point reduction can lower the risk of diabetes complications by 20-50%.

Shaini. G.S (2006) found that the mean knowledge score of exercise had improved from 1.98 to 3.5 after a structured teaching programme on the home care management of diabetic patients. Alan.L (2002) stated that patients had at least weekly contact with diabetes educator and received changes insulin or medication, helped in the change in HbA1c level at 3 months. And also there are only a few nursing studies related to the physical activities of diabetic patients.

It was noticed that most of the clients were engaged in a variety of physical activities routinely. The question aroused was whether these physical activities may help in the control of blood sugar al though they may be in anti diabetic drugs and diabetic diet. These observations motivated the investigator to conduct a study on the physical activities among type 2 diabetic patients with controlled and uncontrolled blood sugar.

STATEMENT OF THE PROBLEM

A descriptive study on the physical activities among type 2 diabetes patients with controlled and uncontrolled blood sugar in a selected hospital at Kollam district, Kerala.

OBJECTIVES

1. To compare the physical activities among type 2 diabetic patients with controlled and uncontrolled blood sugar.
2. To find the correlation between the physical activities and the post prandial blood sugar, body mass index among type 2 diabetic patients with controlled and uncontrolled blood sugar.
3. To determine the significant association between the physical activities, postprandial blood sugar and selected factors among the type 2 diabetic patients with controlled and uncontrolled blood sugar.

HYPOTHESES

H_1 There will be a significant difference in the physical activities between type 2 diabetic patients with controlled and uncontrolled blood sugar.

H_2 There will be a significant difference in the speed in physical activities between type 2 diabetic patients with controlled and uncontrolled blood sugar.

H_3 There will be a significant difference in the sweating during physical activities between type 2 diabetic patients with controlled and uncontrolled blood sugar.

H_4 There will be a significant correlation between the physical activities and the post prandial blood sugar among type 2 diabetic patients with controlled and uncontrolled blood sugar.

H_5 There will be a significant correlation between the physical activities and body mass index among type 2 diabetic patients with controlled and uncontrolled blood sugar.

H_6 There will be a significant association between the physical activities and selected factors among type 2 diabetic patients with controlled and uncontrolled blood sugar.

H_7 There will be a significant association between selected factors and post prandial blood sugar among type 2 diabetic patients with controlled and uncontrolled blood sugar.

OPERATIONAL DEFINITIONS

1. Physical Activity: Refers to any bodily movement produced by skeletal muscle of the diabetic patients such as daily activities, personal activities, housework, exercise, leisure activities, traveling and occupation that requires energy expenditure as measured by the items in the semi-structured questionnaire. For the purpose of the study, physical activities in type 2 diabetic patients were measured as 1) time spent for physical activity 2) speed in the activity 3) sweating during the activity.

2. Type 2 Diabetes patients: Refer to those patients who diagnosed to suffer from type 2 diabetes and those who were attending OPD in Vijaya Hospital, Kottarakkara.

3. Controlled blood sugar: Refers to the blood sugar of type 2 diabetic patients in which it was less than 190 mg% after 2 hours of intake of normal food.

4. Uncontrolled blood sugar: Refers to the blood sugar of type 2 diabetic patients in which it was more than 190 mg% after 2 hours of intake of normal food.

5. Selected factors: Refers to those factors which were likely to influence the physical activities of type 2 diabetic patients such as age, sex, religion, marital status, education, monthly income, occupation, strain in job, location of residence, duration of diabetes, body mass index, regularity of taking treatment for diabetes and regularity of checking the blood sugar.

ASSUMPTIONS

1. Diabetic patients would co-operate with the investigator and be willing to participate in the study.
2. The items included in the tool would be adequate and sufficient to collect the information regarding the physical activities of the type 2 diabetic patients.
3. Selected areas regarding the physical activities were common to both the controlled and uncontrolled type 2 diabetic patients.
4. The response of type 2 diabetic patients to the items in the tool will be the measure of their physical activity.

DELIMITATIONS

1. The total period of data collection was delimited to only four weeks.
2. Sample selection would be through purposive sampling.
3. Data collected through self-reporting questionnaire.
4. The setting was only a private hospital, Vijaya Hospital, Kottarakkara.

CONCEPTUAL FRAMEWORK

A good researcher generally integrates research findings to an orderly, coherent system; such integration typically involves linking new research to the orderly coherent system which is termed as a set of concepts.

A conceptual framework is made up of concepts which are mental images of phenomenon. These concepts are linked together to express the relationship between them. It guides the investigator to know what data needs to be collected and gives direction to the entire research process.

In the present study the researcher developed a conceptual framework on the basis of Structure -Process- Outcome Model to analyze the physical activities among type 2 diabetic patients in the control of blood sugar

Structure : The following aspects of the type 2 diabetic patients were considered to be the structure such as age, sex, religion, marital status, education, monthly income, occupation, strain in job, location of residence, duration of diabetes, body mass index, regularity of treatment, checking blood sugar and physical activities.

The physical activities performed by type 2 diabetic patients were categorized as daily activities, personal activities, housework, leisure activities, exercise, traveling and occupation.

1. *Daily activities:* referred to the activities such as brushing, toileting, bathing, dressing and eating & drinking done by type 2 diabetic patients.
2. *Personal activities :* were the activities such as sleeping, relaxing by sitting, standing and sexual activity performed by type 2 diabetic patients.
3. *Housework:* referred to the activities such as cooking, washing clothes, cleaning beds, cleaning the house, care of animals, caring of vehicles, working in farm, cleaning the yard and caring the children done by type 2 diabetic patients.
4. *Leisure activities:* referred to reading newspaper, watching TV and talking to others by type 2 diabetic patients.

5. *Exercise:* referred to the activities such as walking, walking upstairs, walking downstairs, running, jogging, aerobics, swimming, playing outdoor games and playing indoor games.
6. *Traveling:* included the traveling in a bus, cycling, driving a car and biking done by type 2 diabetic patients.
7. *Occupation:* referred to the activities such as sitting & writing, light work, moderate work and heavy work by type 2 diabetic patients.

Process : It was time spent for the different physical activities, speed of the activities and the sweating during the activities among type 2 diabetic patents.

Outcome : If type 2 diabetic patients were spending more time for the physical activities, it will result in the controlled blood sugar. If they were spending less time engaging in the physical activities, it will lead to uncontrolled blood sugar in type 2 diabetic patients.

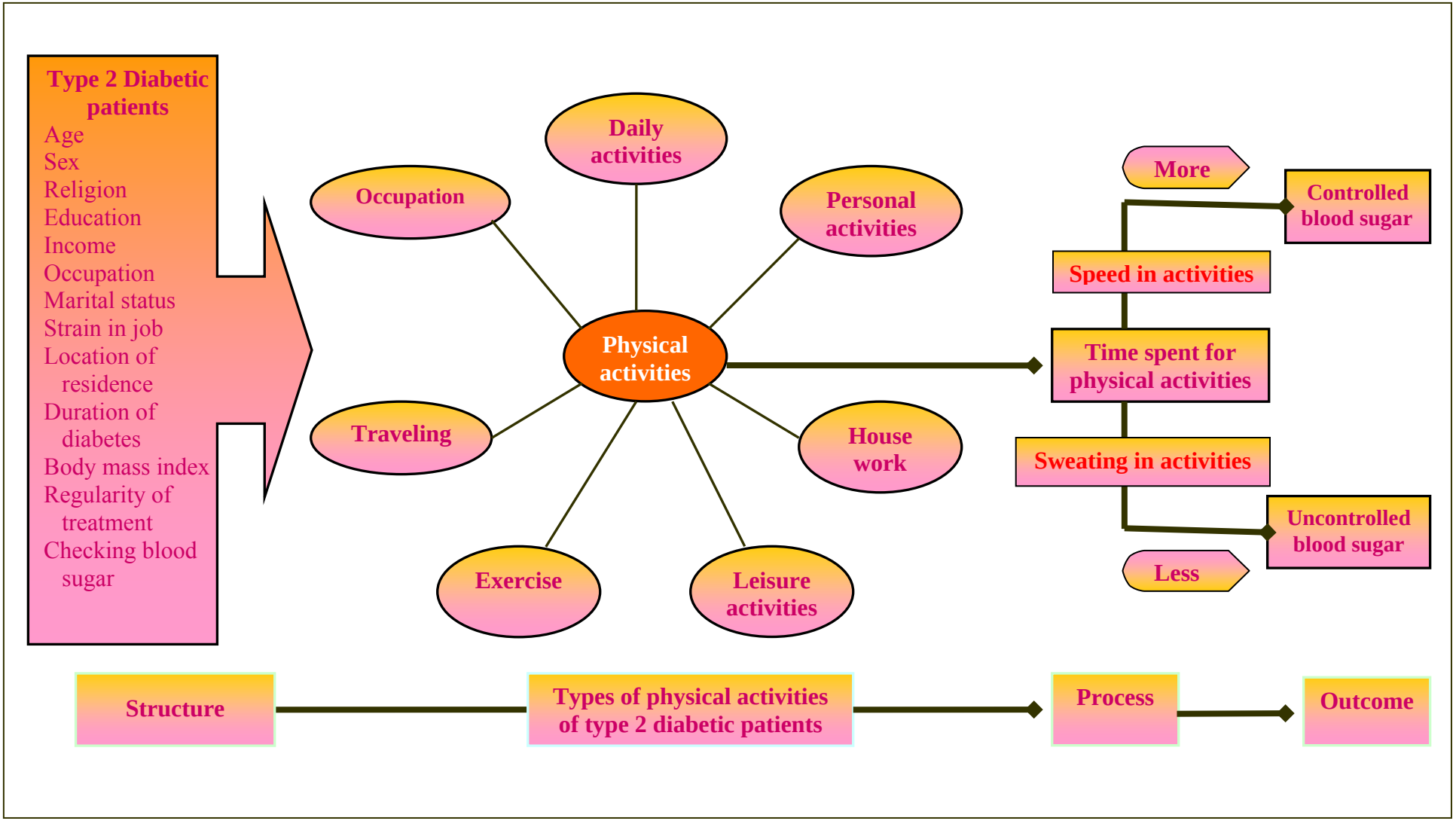


Fig: 1 Conceptual Framework Based On Structure Process Outcome Model

Chapter – II

Review of Literature

CHAPTER –II

REVIEW OF LITERATURE

"It is time to look at how diabetes impacts people, both socially and economically". – Srivastava. M. C

Review of literature is used to designate a written summary of the act on a research problem. Literature review can search a number of important functions like identification of the topic, ascertaining what is already known in relation to a problem of interest, developing a broad conceptual context into which a research problem will fit and suggesting ways to going about the business of conducting a study on a topic of interest.

An extensive literature review was done for the present study is presented under the following headings.

1. Studies related to the physical activities among type 2 diabetic patients.

2. Studies related to the physical activities in the control of blood sugar among type 2 diabetic patients.

I) STUDIES RELATED TO THE PHYSICAL ACTIVITIES AMONG TYPE 2 DIABETIC PATIENTS.

Ansari. M et al (2007) assessed the effect of physical activities such as occupational, household and daily lifestyle activities and obesity on the prevalence of type 2 diabetes in 2053 population based cross-sectional samples aged 45-64 years in Pakistan by administering a self-reporting physical activity questionnaire. The questionnaires evaluated regular exercise and sports participation during the 2 years. The Cox Proportional Hazards model was used to estimate the risk of developing the type 2 diabetes mellitus. It was observed that stair climbing was inversely associated with the risk of diabetes and cycling was also associated with a reduced risk of type 2 diabetes (RR=0.82, 95% CI, 0.68-1.00, p=0.048). The relationship between physical activity and reduced risk of diabetes adjusted for age and BMI was statistically significant only in women (RR=0.72, 95% CI, 0.58-1.97, p=0.04). The study concluded that physical activity in leisure time exercise or daily activity reduces the risk of type 2 diabetes in a high risk population.

Siegel. C et al (2006) conducted a prospective cohort study related to physical activity, body mass index and diabetes risk among 20,757 men without diabetes. After a median follow-up of 23.1 years, there were 1836 cases of incident diabetes. Compared to active participants with normal BMI, active but overweight and obese men had multivariable hazard ratios of 2.39 (95% CI, 2.1-2.7) and 6.22(95% CI, 5.1-7.6). Inactive men with normal, overweight or obese BMIs had multivariable adjusted hazard ratios of 1.41(95% CI, 1.2-1.7); 3.14(95% CI, 2.7-3.6) and 6.6 (95% CI, 5.3-8.2). The study concluded that active men with normal and overweight BMIs had lower diabetes hazards than the inactive men.

Meisinger. C. et al (2004) examined sex-specific associations between leisure time physical activity and incident type 2 diabetes in a representative population sample of 4,069 men and 4,034 women aged 25 to 74 years were free of diabetes at baseline in Germany. Incidences of type 2 diabetes were assessed using a follow-up questionnaire and sex-specific hazard ratios (HRs) were estimated from Cox proportional hazard models. The study revealed that a total of 145 cases of incident type 2 diabetes among men and 82 among women were registered during the mean follow-up period of 7.4 years. In both sexes, a high leisure time physical activity level was associated with a reduced risk of incident type 2 diabetes. After adjustment for confounding factors, the HR in highly active men was 0.83 (95% CI: 0.50–1.36). In contrast, highly active women had the lowest risk of type 2 diabetes even after multivariable adjustment (HR 0.24; 95% CI: 0.06–0.98). In subgroup analyses, after multivariable adjustment, the protective effect of moderate to high physical activity was significant in women with a BMI below 30 kg/m^2 (HR 0.24; 95% CI: 0.09–0.65) but not in women with a BMI of 30 kg/m^2 or higher (HR 0.97; 95% CI: 0.44–2.11).

Priscilla. M. N (2004) determined the influencing factors, the clinical variables and demographic variables among 544 patients with type 2 DM attending the integrated diabetes clinic at CMC, Vellore, selected by systematic random sampling. The tools used were foot status examination checklist, knowledge questionnaire, attitude scale and modified diabetes self-care activity scale. The study showed that most of the subjects 70% with adequate knowledge had adequate self- care activity χ^2=13.2(p=0.01). Half the subjects with moderately favourable attitude had adequate self-care activity χ^2=5.48 ($p<0.05$). Barefoot walking both inside (p=0.003) and outside (p=0.002) the house had a significant association with the presence of callosities.

Shah. A (2004) examined the relation between obesity and diabetes mellitus among 200 diabetic and 100 non-diabetic Nepalese population at Manipal Teaching Hospital. The study revealed that in both males and females, the mean BMI were higher in diabetic than non-diabetic subjects 25.6 and 24.5 respectively, which were borderline obese. More diabetic subjects 38 males and 28 females were found to be overweight than non-diabetic subjects. The study concluded that BMI of the diabetic subjects was found to be higher than the non-diabetic subjects.

Johnson et al (2003) measured the habitual walking speed of a convenience sample of 19 Type 2 diabetic patients, who were recruited after a 16- week pedometer- based lifestyle program, by wearing an Activity Monitoring Pod 331 for 3 consecutive days during the waking hours. In this study, step count, average speed, average cadence, duration and total distance traveled were calculated. The results showed that the median speed of walking in locomotion was 3.3 Km/h, physical activity ranged from 4,508 to 29,979 steps/day and locomotion walking speed ranged from 2.2 to 4.7 Km/h and these variables were positively correlated ($r=0.6$, $p=0.01$). The study concluded that the cohort does not meet the walking speed of 4 Km/h, which is commonly accepted as moderately intense physical activity. The number of daily steps taken was close to a popular public health goal of 10,000 steps/ day and the time spent in locomotion approximates the current recommendations of physical activity of at least 150min/week of moderate intensity.

Mohan.V, Shanthirani. C. S & Deepa. R (2003) assessed the impact of family history of diabetes, obesity, physical activity on glucose tolerance in 1262 selected Chennai Urban population aged more than or equal to 20 years by administering a detailed questionnaire. All the study subjects underwent a glucose tolerance test (GTT) and were categorized as normal glucose tolerance and impaired glucose tolerance using WHO consulting group criteria. Using SPSS version 10.0, the analysis showed that the prevalence of diabetes was significantly higher among subjects with light grade activity (17%) compared to moderate (9.7%, $p=0.0001$)

and heavy grade activity (5.6%, p<0.0001). the prevalence of impaired glucose tolerance was higher among subjects with moderate 7.8%, p=0.005 and light grades of physical activity 6.2%, p=0.03 compared to heavy 2.5%. The prevalence of glucose intolerance was significantly higher among subjects who had light grade activity (23.2%) compared to moderate (17.5%, p=0.04) and heavy grade activity (8.1%, p<0.00001). Regression analysis was done and moderate (AOR= -2.41, p=0.001), light (AOR= -3.44, p<0.001) activity showed a strong association with glucose tolerance after adjusting the age and family history of diabetes mellitus.

Armstrong et al (2001) conducted a prospective longitudinal study to evaluate the magnitude and location of the activity of 20 male diabetic patients at high risk of foot amputation from a diabetic clinic at Southern Arizona, by administering a continuous activity monitor and a log book to record the time periods spent for activity for a period of 1 week. The study showed that patients took more steps per hour outside their home than inside (mean=371.6, S.D= 57.8 Vs mean=130.2, S.D=24.9, p=0.001). But the patients took more steps per day inside their homes than they did outside. (Mean=2,380.6, S.D=421 Vs mean=2167.4, S.D=570.3, p=0.033). The results concluded that patients with diabetes who were at high risk for diabetic foot ulceration may be at least as active during periods of time spent at home as when they are outside to reduce the incidence of ulceration and amputation.

Armstrong. G & Lavery. A (2000) evaluated the role of activity in the development of neuropathic foot ulceration in 100 diabetic patients by administering a high capacity continuous computerized activity monitor over a period of 25 weeks. High capacity computerized pedometer can measure the number of steps taken over a period of time and also records the time of the day each step occurred. The results occurred that 8 subjects got ulcerated during the study and that the average daily activity was significantly lower in individuals who ulcerated (mean= 809, S.D= 612.2) compared with the individuals who did not ulcerate (mean= 1394.5, S.D= 868.5) at p=0.03 significant level. By using Mann-Whitney U test; the data showed that

there was a large difference in variability i.e. co-efficient of variation was significantly greater in the ulceration group (mean=96.4, S.D=50.3) compared with the no ulceration group (mean= 44.7, S.D= 15.4) at p=0.0001 significant level.

Krieg. G (2000) conducted an interventional study in Plattsburg University, New York on the impact of self-reporting of daily activity records on the levels and self-efficacy of physical activities among 58 Type 2 diabetes patients aged 40 to 65 years, who were randomly selected for a period of 6 weeks of data collection, using the Habitual Physical Activity Index and the Self-Efficacy for Exercise Scale. With the help of SPSS version 1.5, descriptive and inferential statistics had done and it showed that a significant difference between the groups (F=7.23, p=0.01) regarding the outcome in self-efficacy, with the intervention group (mean=3.69, S.D=0.91) showing greater self-efficacy than the control group (mean= 3.23, S.D= 1.00). It also revealed that physical activity was significantly increased in both the intervention group (F=17.04, p=0.00) and the control group (F= 7.98, p=0.01). The study reported a result of enhanced self-efficacy and physical activity improved in both the intervention and control groups. Daily activity recording can be used to motivate the people to higher levels of physical activity.

Rigla (2000) did a comparative study on the effect of physical exercise on lipoprotein and low density lipoprotein modification in 14 type 1 and 13 type 2 diabetic patients. Anthropometric parameters, insulin requirements, blood pressure, the lipid profile, LDL composition, size and susceptibility to oxidation and the proportion of electronegative LDL were measured before and after 3 months of physical exercise. There was a significant decrease in LDL cholesterol, subscapular to triceps skin fold ratio ($p<0.01$), mid arm circumference ($p<0.001$), insulin requirements ($p<0.05$), diastolic blood pressure ($p<0.01$) in type 2 diabetic patients after exercise.

Villegas et al (2000) did a prospective cohort study to examine the effect of occupational, commuting physical activity, daily living and leisure time physical activity on the incidence of Type 2 Diabetes Mellitus among 70658 Shangai women for 4-6 years by conducting an in-person interview and a validated questionnaire. After doing the statistical analysis, the results found were 1973 new cases of type 2 diabetes mellitus to an incidence rate of 6.03 per 1000 person-years. Participants with the highest level of daily and leisure physical activities were at lower risk than those with low levels of activities (RR=0.65, 95% CI 0.49-0.85, p<0.07). The relative risk for housework hours were 1.00, 1.26, 1.22 & 0.97 (p=0.86), showed household activity was associated with a lower risk of diabetes in non-employed and with a higher risk in currently employed participants. It also showed that total METs from leisure physical and daily physical activities were inversely associated with the risk of diabetes (RR=1.00, 1.06.2.01& 0.88, p<0.01).

Fretts. M et al (1999) examined the association between total physical activity (leisure-time plus occupational) and incident diabetes among 1,651 American Indians who participated in the Strong Heart Study, a longitudinal study of cardiovascular disease and its risk factors among 13 American Indian communities. Discrete Cox models were used to examine the association between physical activity level, compared with no physical activity, and incident diabetes**,** after adjustment for potential confounders. During 10 years of follow-up, 454 incident cases of diabetes were identified. Compared with participants who reported no physical activity, those who reported any physical activity had a lower risk of diabetes. Odds ratios were 0.67 (95% CI: 0.46- 0.99), 0.67 (95% CI: 0.45- 0.99), and 0.67 (95% CI: 0.45, 0.99) for increasing tertile of physical activity, after adjustment for age, sex, study site, education, smoking, alcohol use and family history of diabetes. These data suggest that physical activity is associated with a lower risk of incident diabetes in American Indians.

Kriska. M et al (1999) assessed leisure physical activities using self-reporting questionnaires with different time frames in the diabetes prevention program cohort of 3234 overweight individuals aged >25 yrs with impaired glucose tolerance selected by stratified, multistage probability cluster sampling across the U. S. The three questionnaires were the Modifiable Activity Questionnaire (MAQ; past year), the Low-Level Physical Activity Recall (LOPAR; past 7 d), and the Third National Health and Nutrition Examination Survey (NHANES III; past month). Leisure activity determined by the three questionnaires significantly correlated with each other, although the correlations between MAQ and NHANES III were stronger (men: r = 0.52; women: r = 0.49; *P* < 0.01) than between LOPAR and either measure (men: r = 0.20 for MAQ, 0.24 for NHANES; women: r = 0.10 for MAQ, r= 0.13 for NHANES). The study concluded that in the DPP, measures of obesity and glucose tolerance were significantly correlated with activity levels determined by MAQ and NHANES, but not LOPAR. Women were less active than men in both cohorts, with relatively more women reporting being physically inactive, consistent with the DPP's MAQ and the LOPAR results.

Hu F.B et al (1999) determined the relationship of total physical activity and incidence of type 2 diabetes and compared the benefits of walking versus vigorous activity as predictors of subsequent risk of type 2 diabetes by a prospective cohort study among 70,102 female nurses aged 40 to 65 years who did not have diabetes, cardiovascular disease, or cancer at baseline in The Nurses' Health Study. Type 2 diabetes was measured by quintile of metabolic equivalent task (MET) score, based on time spent per week on each of 8 common physical activities, including walking. During 8 years of follow-up, the study documented that 1419 incident cases of type 2 diabetes. After adjusting for age, smoking, alcohol use, history of hypertension, history of high cholesterol level, and other covariates, the relative risks (RRs) of developing type 2 diabetes across quintiles of physical activity (least to most) were 1.0, 0.77, 0.75, 0.62, and 0.54 (P < 0.001). Among women who did not perform vigorous activity, multivariate RRs of type 2 diabetes across quintiles of MET score for walking were 1.0, 0.91,0.73, 0.69, and 0.58 (P < 0.001). After adjusting for BMI, the trend remained statistically significant (RRs were 1.0, 0.95, 0.80, 0.81, 0.74; P = 0 .01). The study suggested that greater

physical activity level is associated with substantial reduction in risk of type 2 diabetes, including physical activity of moderate intensity and duration.

Manson J. E et al (1991) examined prospectively the association between regular exercise and the subsequent development of non-insulin-dependent diabetes mellitus (NIDDM) among 21,271 US male physicians participating in the Physicians' Health Study, aged 40 to 84 years and free of diagnosed diabetes mellitus, myocardial infarction, cerebrovascular disease, and cancer at baseline. During 5 years of follow-up, 285 new cases of NIDDM were reported. The age-adjusted incidence of NIDDM ranged from 369 cases per 100,000 person-years in men who engaged in vigorous exercise less than once weekly to 214 cases per 100,000 person-years in those exercising at least five times per week (P< 0 .001). Men who exercised at least once per week had an age-adjusted relative risk (RR) of NIDDM of 0.64 (95% CI, 0.51 to 0.82; P = .0003) compared with those who exercised less frequently. The age-adjusted RR of NIDDM decreased with increasing frequency of exercise: 0.77 for once weekly, 0.62 for two to four times per week, and 0.58 for five or more times per week (P, trend, .0002). A significant reduction in risk of NIDDM persisted after adjustment for both age and body-mass index: RR, 0.71 (95% CI, 0.56 to 0.91; P = .006) for at least once per week compared with less than once weekly, and P< 0.009, for increasing frequency of exercise.

Manson. J. E et al (1990) examined the association between regular vigorous exercise and the subsequent incidence of NIDDM in a prospective cohort of 87,253 US women aged 34-59 years and free of diagnosed diabetes, cardiovascular disease, and cancer. During 8 years of follow-up, the study confirmed 1303 cases of NIDDM. Women who engaged in vigorous exercise at least once per week had an age-adjusted relative risk (RR) of NIDDM of 0.67 ($p < 0.0001$) compared with women who did not exercise weekly. After adjustment for body-mass index, the reduction in risk was attenuated but remained statistically significant (RR = 0.84, $p = 0.005$). When analysis was restricted to the first 2 years after ascertainment of physical activity level and to symptomatic NIDDM as the outcome, age-adjusted RR of those who exercised was 0.5, and age and body-mass index adjusted RR was 0.69, ($p<0.05$). Among

women who exercised at least once per week, there was no clear dose-response gradient according to frequency of exercise. Family history of diabetes did not modify the effect of exercise, and risk reduction with exercise was evident among both obese and nonobese women. The study concluded that physical activity may be a promising approach to the primary prevention of NIDDM.

II) STUDIES RELATED TO THE PHYSICAL ACTIVITIES IN THE CONTROL OF BLOOD SUGAR AMONG TYPE 2 DIABETIC PATIENTS.

Bossoni. S et al (2007) investigated the correlation between Instrumental Activities of Daily Living (IADL) and blood glucose control among 43 patients (18 males and 25 females) by a cross-sectional study. IADL was assessed through a self-reporting questionnaire on performance and capacity for 5 areas of housework, taking medications, management of finances, phone use and travel. Lower overall IADL score indicated better functioning and total IADL score above 2 was considered as IADL disability. Multivariate logistic regression analysis showed that the overall IADL score was significantly only with HbA1c (OR=4.4, 95% CI 1.4 to 13.8, p=0.009) in diabetic patients. In the whole group of diabetic patients, the median IADL score was not significantly different from that of control subjects but diabetic patients with poorly controlled diabetes had IADL disability score significantly higher than diabetic patients with well-controlled disease and normal subjects ($p<0.05$).

Seyyednozadi et al (2007) evaluated the role of physical activity and nutrition in controlling type 2 diabetes mellitus among diabetic patients selected by purposive sampling and randomly categorized into 4 groups of physical activities alone, following respect diet alone, both physical activity and respect diet and one control group for a period of 1 year. In this study, comparison of 4 groups showed recommended physical activity had significant effect in decreasing FBS, 2 hrs PPBS and HbA1c ($p<0.03$) whereas the recommended diet led to merely significant decrease in FBS (p=0.032). Diabetic patients who were recommended for both physical activity and diet were not significant al though they have decreased the weight and drug. In control group, the variables decrease with increase in the drug dosage.

Sigal. J et al (2007) did a randomized control trial with a parallel group design on 251 type 2 diabetes mellitus patients from 8 community facilities in Canada to determine the effects of aerobic training alone, resistance training alone and combined exercise training on glycosylated hemoglobin values for a period of 6 months. A sedentary control group was also present. The exercise training was given in such a way those 45 mts for each type given 3 times per week for 22 weeks. The primary outcome was the change in the HbA1c value at 6 months. Secondary outcomes were changes in body composition, plasma lipid values and blood pressure. The results showed that there was absolute change in HbA1c value in the combined exercise group with the control group -0.51% point (95%CI -0.87 to -0.14) in the aerobic training group, -0.38% point (95%CI, -0.72 to –0.22) at α =0.05 level. The combined exercise group resulted in an additional change of -0.46% point (95% CI,-0.83 to -0.09) compared with aerobic training alone and -0.59% point (95%CI, -0.95 to -0.23) compared with resistance training alone. The study concluded that either aerobic or resistance training improves glycemic control in type 2 diabetic patients but the improvements were greatest with combined exercise training.

Colberg. R.S et al (2006) examined the effects of exercise before or after an evening meal among 12 men and women type 2 diabetic patients in Virginia. Three trials conducted on separate days consisting of a rest day when subjects consumed a standardized dinner with a moderate glycemic effect and 2 exercise days when they undertook 20 minutes of self-paced treadmill walking immediately before or 15 to 20 minutes after eating. Both absolute and elative changes in glucose levels were determined from the blood samples taken every 30 minutes over a 4-hour period and later assayed for plasma glucose. Twenty minutes of self-paced walking done shortly after meal consumption resulted in lower plasma glucose levels at the end of exercise compared to values at the same time point when subjects had walked pre-dinner. Postprandial walking was more effective at lowering the glycemic impact of the evening meal in individuals with type 2 diabetes compared with pre-meal or no exercise and plasma glucose. ($P < .05$).

Sivananda.N, Arun.M & Manjunath.H (2005) did an interventional study to assess the influence of treadmill exercise on blood glucose homeostasis in 20 NIDDM patients (10 experimental & 10 control) aged 45-60 yrs at Manipal Medical College for a period of 6 weeks. PPBS, FBS, weight, BMI, waist-hip ratio, muscle strechability and strength of the lower limbs were assessed before and after the intervention. Motor driven treadmill was used with fixed speed of 3.4Km/hr, inclination of 4.2 angle and Borg's score of 13-14 for the rate of perceived exertion. Exercise was given for 5 mts warm-up, 50 mts of treadmill walk and 5 mts of cool down phase. After statistical analysis, the results showed that there was significant decrease in PPBS as 44.4mg% for the study group and 32.2mg% for the control group with a significant inter group difference at $p<0.05$. The mean decrease in FBS (39.4mg% for the study group and 27.4mg for the control group) with an intergroup difference at $p<0.05$ was observed. This revealed the efficacy of exercise as supplement to diet and drug in the control of blood sugar in diabetic patients.

Pigman.T, Gan.X & Krousel-wood.A (2002) conducted a case-control study among randomly selected 300 Type 2 diabetic patients in New Orelands Medical Centre to determine the role of exercise in the management of diabetes as glycemic control by administering a routine preventive medicine questionnaire. 92 patients identified as poor diabetic control (HbA1c >/= 8) were classified as cases and 176 with good diabetic control (HbA1c < 8) were classified as controls. The groups were compared with respect to exercise, medicine, diet and other important variables. On analysis, it showed that after adjustment for age race, smoking, BMI, diet, diabetic drugs, patients without regular exercise were 2.71 times more likely than patients with regular exercise to have poor diabetic control (AOR=2.71, 95% CI, 1.38-5.32, p=0.004).

Boule et al. (2001) undertook a systematic review and meta-analysis on the effects of physical activity interventions on glycemic control and body weight among 504 type 2 diabetes mellitus patients for duration of 8 weeks. Twelve aerobic training studies and two resistance training studies were included and the results were pooled using standard meta-analytic statistical methods. The exercise and control groups did not differ at baseline in HbA1c or body weight. Post intervention HbA1c was significantly lower in exercise than control groups (7.65 vs. 8.31%, weighted mean difference −0.66%; $P < 0.001$). In contrast, post intervention body weight did not differ between exercise and control groups. Meta-regression confirmed that the beneficial effect of exercise on HbA1c was independent of any effect on body weight. Therefore, structured exercise programs had a statistically and clinically significant beneficial effect on glycemic control.

Chapter – III

Methodology

CHAPTER –III

METHODOLOGY

The study was conducted on the physical activities among type 2 diabetic patients with controlled and uncontrolled blood sugar in a selected hospital at Kollam district, Kerala.

This chapter deals with research design, setting, population, sample and sample size, sampling technique, sample selection criteria, description of the tool, scoring, validity of the tool, reliability of the tool, pilot study, data collection procedure, plan of data analysis and ethical consideration.

RESEARCH DESIGN

A descriptive study was done to compare the physical activities between type 2 diabetic patients with controlled and uncontrolled blood sugar in a selected hospital at Kollam district, Kerala. The design used was a comparative design, descriptive in nature.

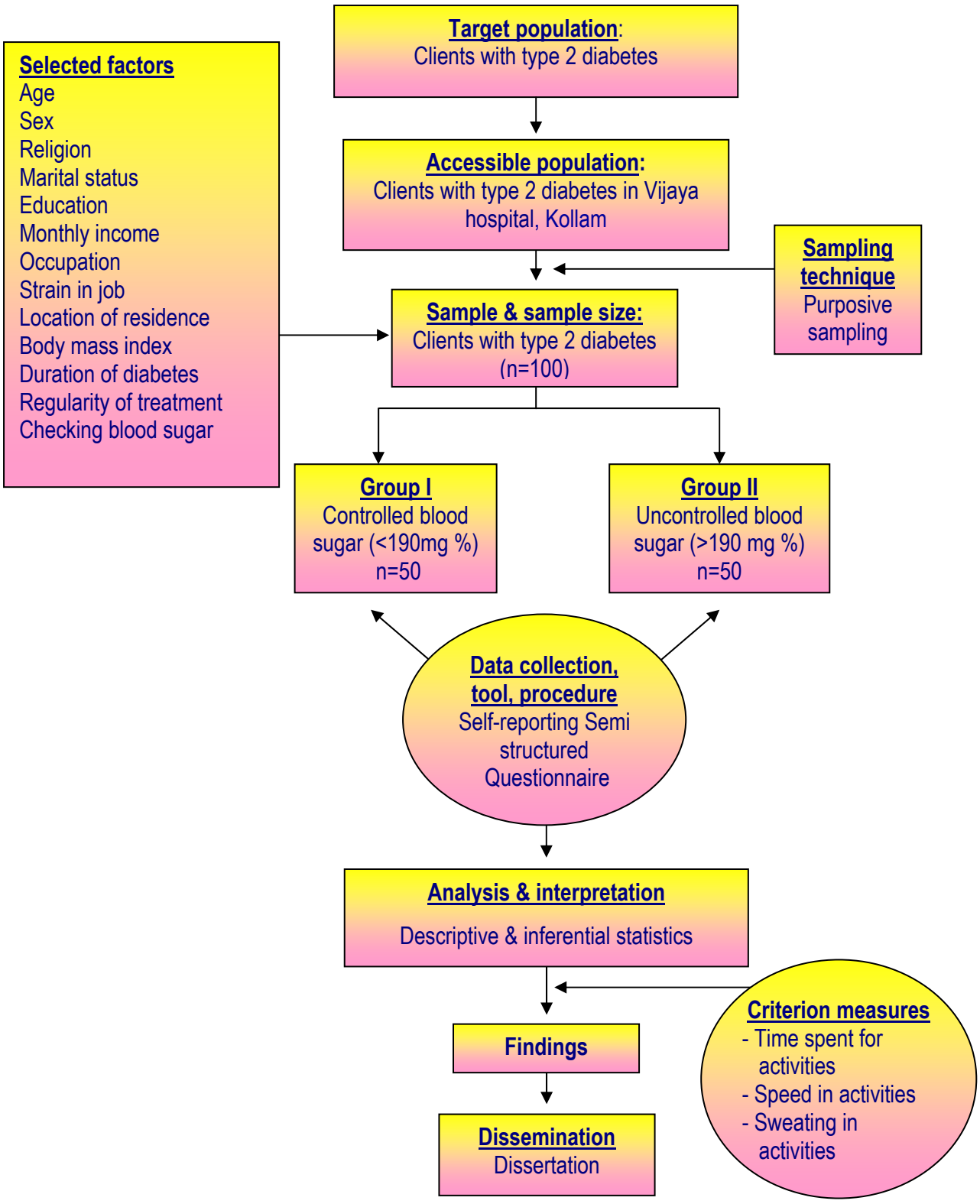


FIG: 2 SCHEMATIC REPRESENTATION OF RESEARCH DESIGN

SETTING

Polit and Hungler (2004) considered the setting as the availability of subjects, co-operation from the authorities and feasibility of the time, money, men and material.

The setting for the study was Vijaya hospital, at Kollam district, Kerala.

POPULATION

a) **Target population:** It is the aggregate of cases about whom the investigator would like to make the generalization of the research findings. In the present study, patients with type 2 diabetes were the target population.

b) **Accessible population:** It is the aggregate of cases that conform to the designed criteria and which is accessible to the investigator as a part of subject for conducting the study. The accessible population for this study were type 2 diabetic patients with controlled and uncontrolled blood sugar coming to OPD of Vijaya Hospital, at Kollam district, Kerala.

SAMPLE AND SAMPLE SIZE

The sample size is determined by the type of the study, variables being studied, feasibility of men, money, material and time.

In this study, the sample size was arbitrarily decided to be 100 type 2 diabetic patients, inclusive of with 50 controlled and 50 uncontrolled blood sugar.

SAMPLING TECHNIQUE

Sampling technique is the process of selecting a portion of the population to represent the entire population. In this study, purposive sampling was adopted.

SAMPLING CRITERIA

The study samples were selected by the following inclusion and exclusion criteria.

Inclusion criteria refers to patients,

a) Who were diagnosed to have Type 2 diabetes mellitus for atleast 2 years.
b) Who were coming to the OPD, Vijaya Hospital, Kollam.
c) Aged between 40 and 60 years.
d) Both males and females were included.
e) Who were willing to participate in the study.
f) Who were able to read and write Malayalam.

Exclusion criteria refers to patients,

a) Who developed any diabetic ulcers or any other peripheral vascular disorders.
b) Who were with deformities that restrict the physical activities.
c) Who were with any mental or neurological problems.

DEVELOPMENT OF THE TOOL

The tool is a written device that a researcher uses to collect the data. After a careful review of literature, the investigator was able to develop a self administered tool to analyze the physical activities among type 2 diabetic patients with controlled and uncontrolled blood sugar.

DESCRIPTION OF THE TOOL

The tool used for the research study was a semi structured questionnaire. The tool consisted of 2 parts:

Part – I: Background variables

Part- II: Activity analysis of diabetic patients.

Part-I: Background variables : It consisted of 16 questions seeking information regarding the background variables of type 2 diabetic patients. The items used included were age, sex, religion, marital status, education, monthly income, occupation, strain in job, location of residence, duration of diabetes mellitus, height, weight, body mass index, post prandial blood sugar, regularity of taking treatment of diabetes and frequency of checking blood sugar.

Part-II: **Activity analysis of type 2 diabetic patients** : The tool included with the activity analysis of type 2 diabetic patients, consisted of the average time spent on a day for the physical activity, speed of the physical activity and sweating during the physical activity**.** It **c**onsisted of 7 areas namely, daily activities, personal activities, housework, leisure activities, exercise, traveling and occupation. There were 38 items in this section. The items were distributed as follows:

A. Type of activity

1. Daily activities : 5 items
2. Personal activities : 4 items
3. Housework : 9 items
4. Leisure activities : 3 items
5. Exercise : 9 items
6. Traveling : 4 items
7. Occupation : 4 items

B. Speed of activity –The subjective response of the participants regarding the speed of each activity was measured in the likert scale.

Slow (1), Moderate (2), Fast (3).

C. Sweating in activity – Participants were expected to respond regarding sweating during each activity with given likert scale.

Always - Often (3), Sometimes (2), Rarely - Never (1).

VALIDITY OF THE TOOL

Four experts including one diabetologist and 3 nursing experts validated the tool for its content. The experts were requested to check the relevance, sequence and clarity of the tool. Suggestions were considered and modification of the tool was done according to the opinion of the experts and the final tool was developed. Translation of the tool was done into Malayalam and retranslated to English. Thus validity was established.

RELIABILITY OF THE TOOL

Reliability was established by test-retest method. Ten patients from the same setting were selected and the tool was administered twice with a gap of one week. Reliability coefficient was calculated, using Karl Pearson's correlation method r= 0.76 and the tool were found to be reliable. The samples used for testing reliability were not included in the main study.

PILOT STUDY

The pilot study is a preliminary research conducted to test the elements of design before the commencement of an actual full-scale study. The study was found to be feasible with regard to the time, availability of the subjects and the co-operation of the samples. The samples selected for the pilot study were 10 patients with due permission from the authority. The setting was Vijaya Hospital, Kottarakkara.

DATA COLLECTION PROCEDURE

Formal approval was obtained from the authorities. The data were collected in the month of September 2009 among type 2 diabetes patients attending OPD of Vijaya Hospital, Kottarakkara, Kerala. On an average of 30 type 2 diabetic patients attended the clinics everyday. Sundays were holidays. On an average of 10 diabetic patients participated in the study per day.

Subjects were selected into the study based on sample selection criteria using purposive sampling technique. Initial rapport was established and the purpose of the study was explained to them. Informed consent was obtained orally. Data were collected through the self-reporting method. All the subjects were very much co-operative and the investigator expressed a gratitude for their co-operation. The tool was then edited for their completion. The average time taken for one client was around 25 minutes.

PLAN FOR DATA ANALYSIS

Data analysis enables the investigator to reduce, summarize and organize, evaluate, interpret and communicate numerical information. The data were edited, coded and entered in excel sheet. The data were analyzed using SPSS version 10. A probability of less than 0.05 was considered to be significant. The data were analyzed as follows:

a) Data on background variables of type 2 diabetic patients were analyzed using descriptive statistics and χ^2**.**

b) Data on the physical activities of type 2 diabetic patients were analyzed using mean, 't' value, co-efficient of correlation and χ^2**.**

c) Data on association between physical activities of type 2 diabetic patients and selected factors were analyzed using linear regression.

ETHICAL CONSIDERATION

The research problem and objectives were approved by the research committee. Proper explanation regarding the purpose of study and the nature of questionnaire involved in the study was given. Due permission from the institutional authorities was sought and obtained. Informed consent was taken from the patients. No physical or psychological harm was caused.

Chapter – IV

Data Analysis and Interpretation

CHAPTER IV

DATA ANALYSIS AND INTERPRETATION

The analysis and interpretation of data of this study was done based on the data collected by the self-reporting questionnaire. The results were computed using descriptive and inferential statistics. The data were entered into the Microsoft excel and analyzed using SPSS Version 10.0. A probability value of less than 0.05 was considered to be statistically significant.

The objectives of the study were,

1. To compare the physical activities among type 2 diabetic patients with controlled and uncontrolled blood sugar.

2. To find the correlation between the physical activities and the post prandial blood sugar, body mass index among type 2 diabetic patients with controlled and uncontrolled blood sugar.

3. To determine the significant association between the physical activities, post prandial blood sugar and selected factors among type 2 diabetic patients with controlled and uncontrolled blood sugar.

The data were analyzed and organized under following headings:

Section-I	:	Data on background variables among type 2 diabetic patients with controlled and uncontrolled blood sugar.
Section-II	:	Data on the physical activities among type 2 diabetes mellitus patients with controlled and uncontrolled blood sugar.
Section-III	:	Data on the correlation between the physical activities and the blood sugar, body mass index among controlled and uncontrolled type 2 diabetic patients.
Section-IV	:	Data on association between the physical activities, post prandial blood sugar and selected factors among type 2 diabetic patients with controlled and uncontrolled blood sugar.

SECTION – I : DATA ON BACKGROUND VARIABLES AMONG TYPE 2 DIABETIC PATIENTS WITH CONTROLLED AND UNCONTROLLED BLOOD SUGAR

TABLE: 1

Frequency, percentage and χ^2 distribution regarding background variables of type 2 diabetes patients with controlled and uncontrolled blood sugar.

Background Variables	Type 2 Diabetes				χ^2
	Controlled blood sugar (n=50)		Uncontrolled blood sugar (n=50)		
	No.	%	No.	%	
1.Age(in yrs)					0.04
a) 41-50	17	34	18	36	(p=0.83)
b) 51-60	33	66	32	64	NS
2.Sex					0.64
a) Male	21	42	25	50	(p=0.43)
b) Female	29	58	25	50	NS
3. Marital status					0.001
a) Married	49	98	49	98	(p=1.00)
b) Widow/widower	1	2	1	2	NS
4.Monthly income					1.01
a) Above poverty line	49	98	50	100	(p=0.32)
b) Below poverty line	1	2	-	-	NS
5.Location of residence					2.04
a) Rural	50	100	48	96	(p=0.15)
b) Urban	-	-	2	4	NS
6. Duration of type 2 diabetes					
a) 2-5 yrs	33	66	32	64	1.22
b) 6-10yrs	9	18	11	22	(p=0.75)
c) >10yrs	8	16	7	14	NS
7. Regularity of checking blood sugar					1.01
a) Once in a month	50	100	49	98	(p=0.32)
b) Once in 6 months	-	-	1	2	NS

S: Significant NS: Non-significant

Table: 1 reveals the background data among type 2 diabetic patients with controlled and uncontrolled blood sugar such as age, sex, marital status, monthly income, location of residence, duration of diabetes mellitus and regularity of checking blood sugar.

Regarding **Age**, majority of type 2 diabetes patients with controlled 33(66%) and uncontrolled 32(64%) were in 51-60 years and least with controlled 17(34%) and uncontrolled 18(36%) were in 41-50 years. The obtained χ^2 value 0.04 (p=0.83) was not significant. Therefore the group was comparable with regard to age.

Regarding **Sex**, majority of type 2 diabetic patients with controlled blood sugar 29(58%) were females and least 21(42%) were males. In case of uncontrolled type 2 diabetic patients, both males and females are equally distributed i.e. 25(50%). The obtained χ^2 value 0.64 (p=0.43) was not significant. Therefore the group was comparable with regard to sex.

Regarding **Marital status**, majority of both controlled and uncontrolled type 2 diabetic patients 49(98%) were married and least 1(2%) was a widow/widower. The obtained χ^2 value is 0.001 (p=1.00) was not significant. Therefore the group was comparable with regard to marital status.

Regarding **Monthly income**, majority of controlled type 2 diabetic patients 49(98%) were above poverty line and least1 (2%) was below poverty line. All uncontrolled type 2 diabetic patients 50(100%) were above poverty line. The obtained χ^2 value is 1.01(p=0.32) was not significant. Therefore the group was comparable with regard to monthly income.

Regarding **Location of residence**, all controlled type 2 diabetic patients 50(100%) were from rural area and majority of uncontrolled 48(96%) were from rural and least 2(4%) were from urban area. The obtained χ^2 value is 2.04(p=0.15) was not significant. Therefore the group was comparable with regard to location of residence.

Regarding **Duration of diabetes**, majority of type 2 diabetic patients with controlled 33(66%) and uncontrolled 32(64%) were suffering from diabetes for 2-5 years and least with controlled 8 (16%) and uncontrolled 7(14%) were having diabetes for more than 10 years. The obtained χ^2 value is 1.22 (p=0.75) was not significant. Therefore the group was comparable with regard to duration of diabetes mellitus.

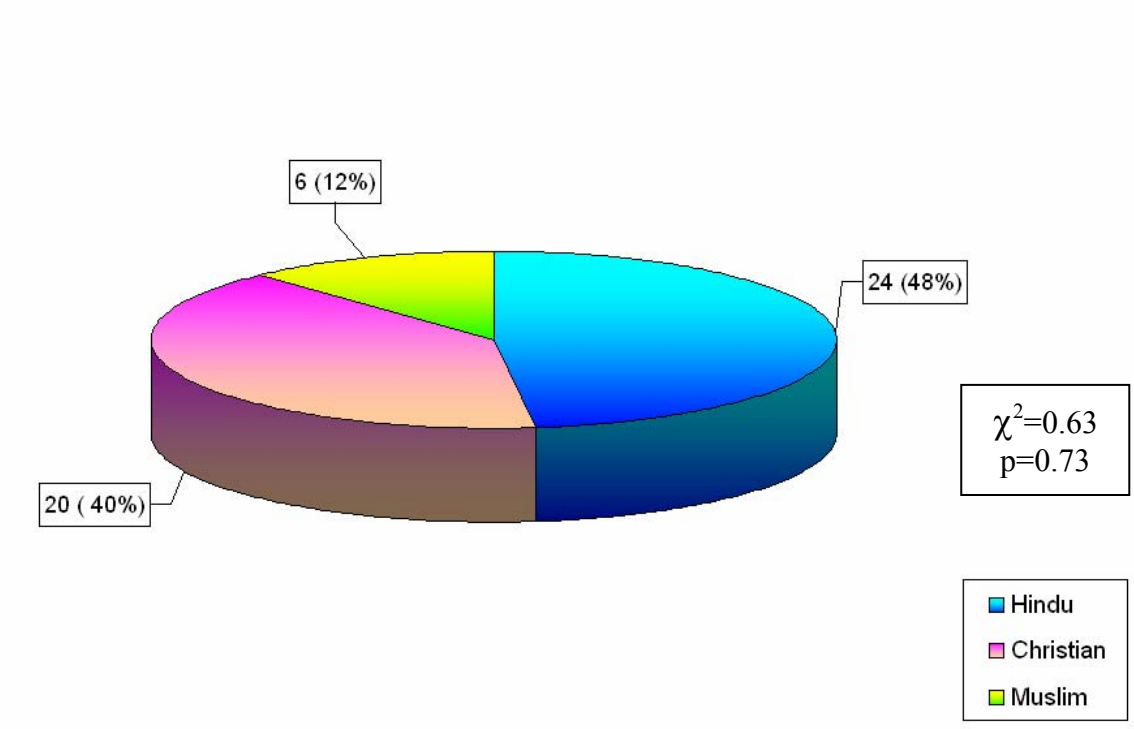
Regarding **Regularity of checking blood sugar**, all controlled type 2 diabetic patients 50(100%) were checking blood sugar once in a month and among uncontrolled, 49(98%) were checking blood sugar once in a month and least 1(2%) was checking blood sugar once in 6 months. The obtained χ^2 value is 1.01(p=0.32) was not significant. Therefore the group was comparable with regard to checking of blood sugar.

It was inferred that majority of type 2 diabetic patients with controlled and uncontrolled blood sugar aged 51-60 years, were females, were married, were above poverty line, belonged to rural area, had diabetes 2-5 years and were checking the blood sugar once in a month. Thus they were comparable groups.

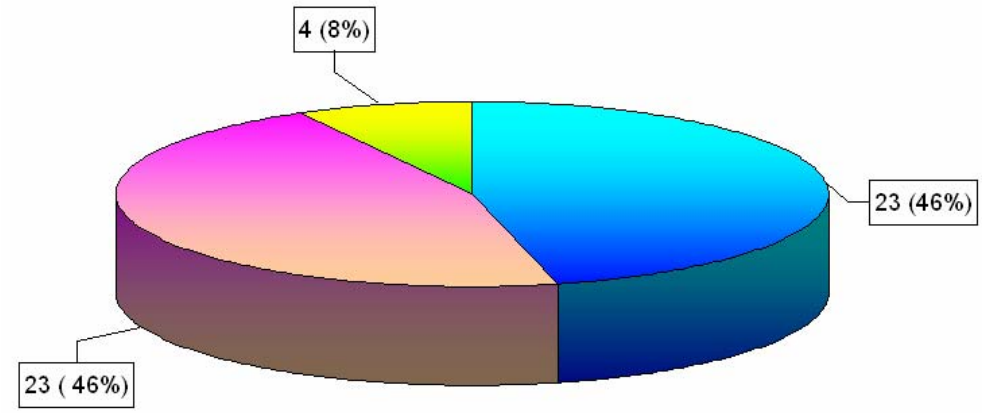
Figure 3 shows frequency and percentage distribution of controlled and uncontrolled type 2 diabetic patients according to religion.

Majority of type 2 diabetic patients with controlled blood sugar 24(48%) were Hindus and least 6(12%) were Muslims. In uncontrolled type 2 diabetic patients, majority were equally distributed as Hindus and Christians 23(46%) and least 4(8%) were Muslims. The obtained χ^2 value 0.63(p=0.73) was not significant. Therefore, the group was comparable with regard to religion.

It was inferred that majority of type 2 diabetic patients were Hindus among controlled and equally distributed as Hindus and Christians among uncontrolled blood sugar.



Controlled diabetic patients



Uncontrolled diabetic patients

Fig. 3 : Frequency and percentage distribution of type 2 diabetic patients according to religion

Figure 4 shows the frequency and percentage distribution of controlled and uncontrolled type 2 diabetic patients according to the education.

Majority of diabetic patients with controlled 17(34%) and uncontrolled 29(58%) blood sugar had high school education and least with controlled 2(4%) and uncontrolled 1(2%) blood sugar had post-graduation and above. The obtained χ^2 value 6.16(p=0.29) was not significant. Therefore the group was comparable with regard to education.

It was inferred that majority of type 2 diabetic patients were educated up to high school.

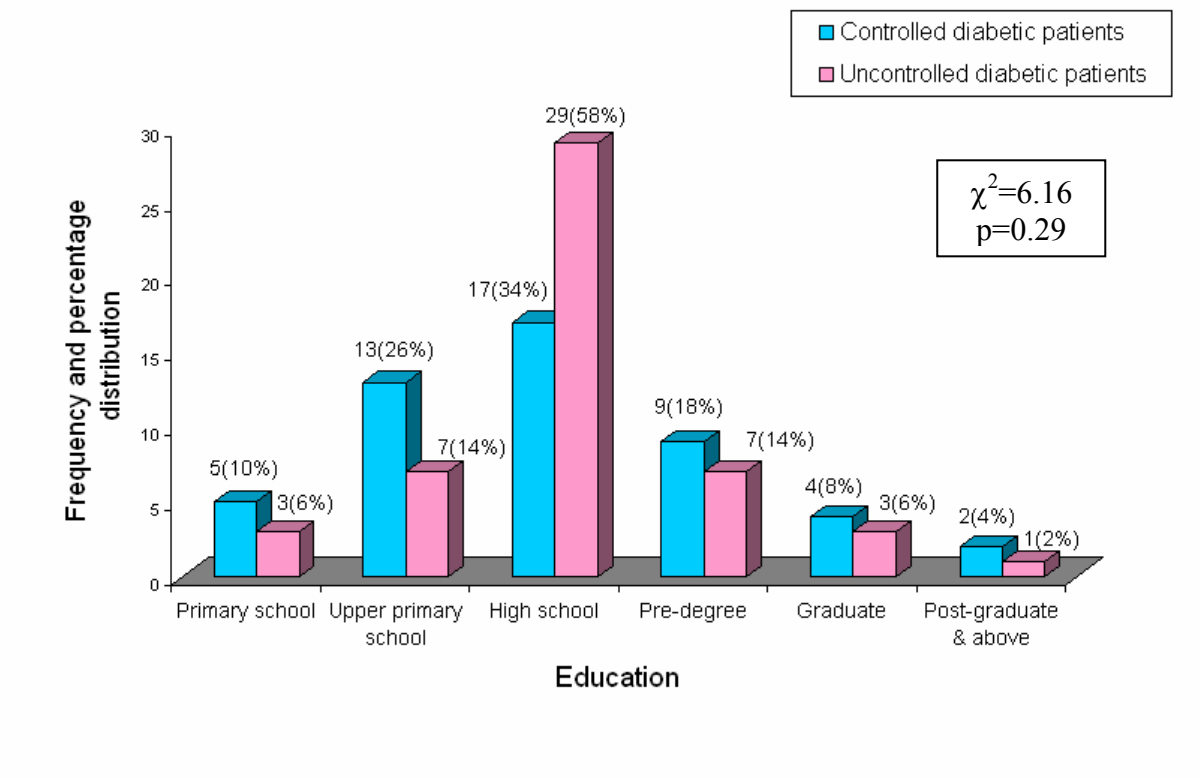


Fig. 4 : Frequency and percentage distribution of type 2 diabetic patients according to Education

Figure 5 shows the frequency and percentage distribution of controlled and uncontrolled type 2 diabetic patients according to occupation.

Majority of controlled 20(40%) and uncontrolled 24(48%) type 2 diabetic patients were semiskilled and least among controlled 1(2%) was retired and uncontrolled 2(4%) were skilled manual-low grade. The obtained χ^2 value 9.07(p=0.17) was not significant. Therefore the group was comparable with regard to occupation.

It was inferred that majority of type 2 diabetic patients were semi-skilled labourers.

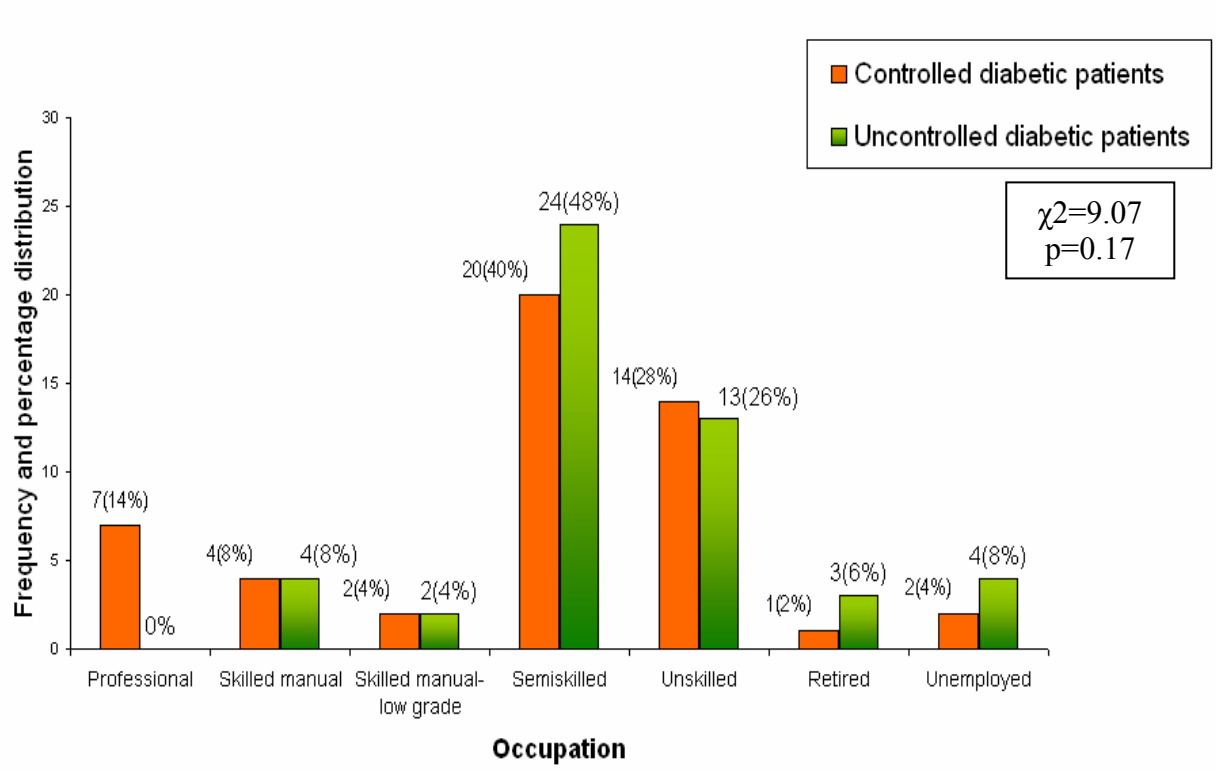


Fig. 5 : Frequency and percentage distribution of type 2 diabetic patients according to Occupation

Figure 6 shows the frequency and percentage distribution of controlled and uncontrolled type 2 diabetic patients according to strain in job.

Majority of controlled type 2 diabetic patients 23(46%) had physical strain or no strain and least 2(4%) with psychological strain alone or both physical and psychological strain. Among uncontrolled type 2 diabetic patients, majority 24(48%) had physical strain in job and least 1(2%) had psychological strain. The obtained χ^2 value 1.85(p=0.60) was not significant. Therefore the group was comparable with regard to strain in job.

It was inferred that majority of type 2 diabetic patients had physical strain in job.

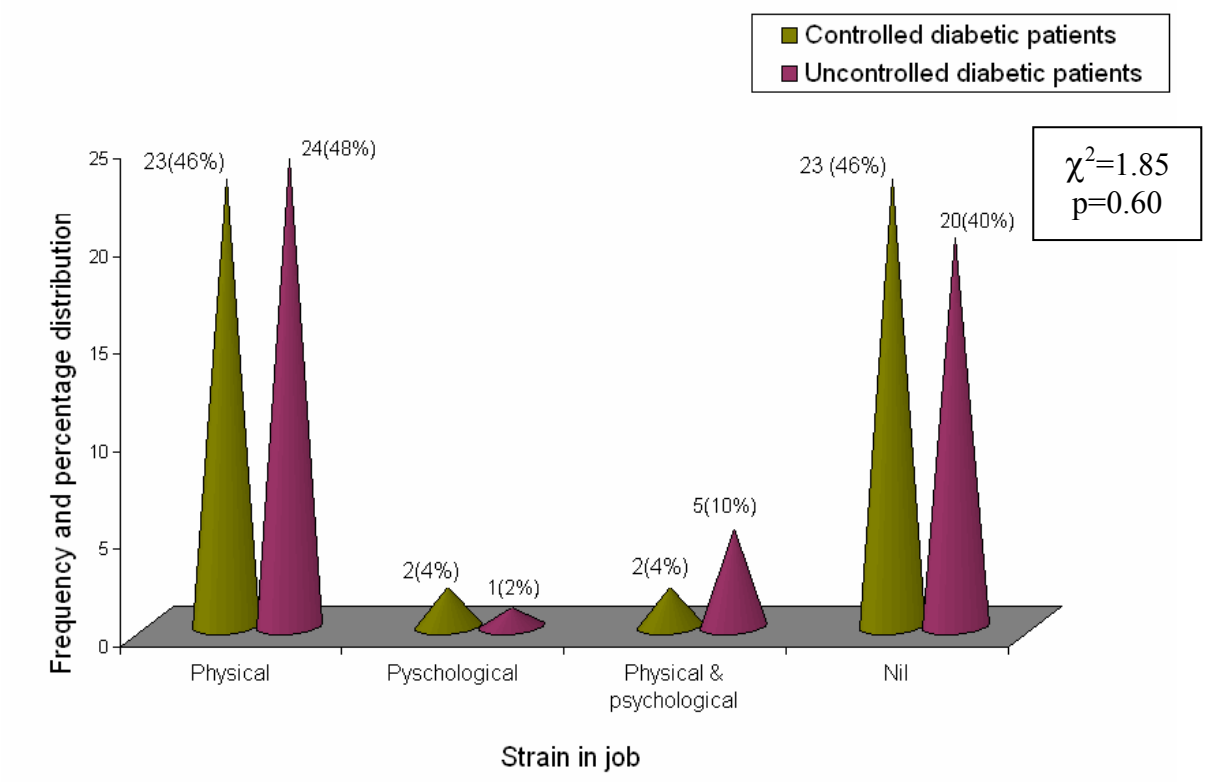


Fig. 6 : Frequency and percentage distribution of type 2 diabetic patients according to Strain in Job

Figure 7 shows the frequency and percentage distribution of controlled and uncontrolled type 2 diabetic patients according to body mass index.

Majority of the controlled type 2 diabetic patients 24(48%) were found to have overweight and least 2(4%) were obese. Among uncontrolled type 2 diabetic patients, majority 25(50%) had normal body mass index and least 3(6%) were found to have underweight. The obtained χ^2 value 1.87(p=0.60) was not significant. Therefore the group was comparable with regard to body mass index.

It was inferred that majority of controlled diabetic patients were having overweight and uncontrolled diabetic patients were having normal body mass index.

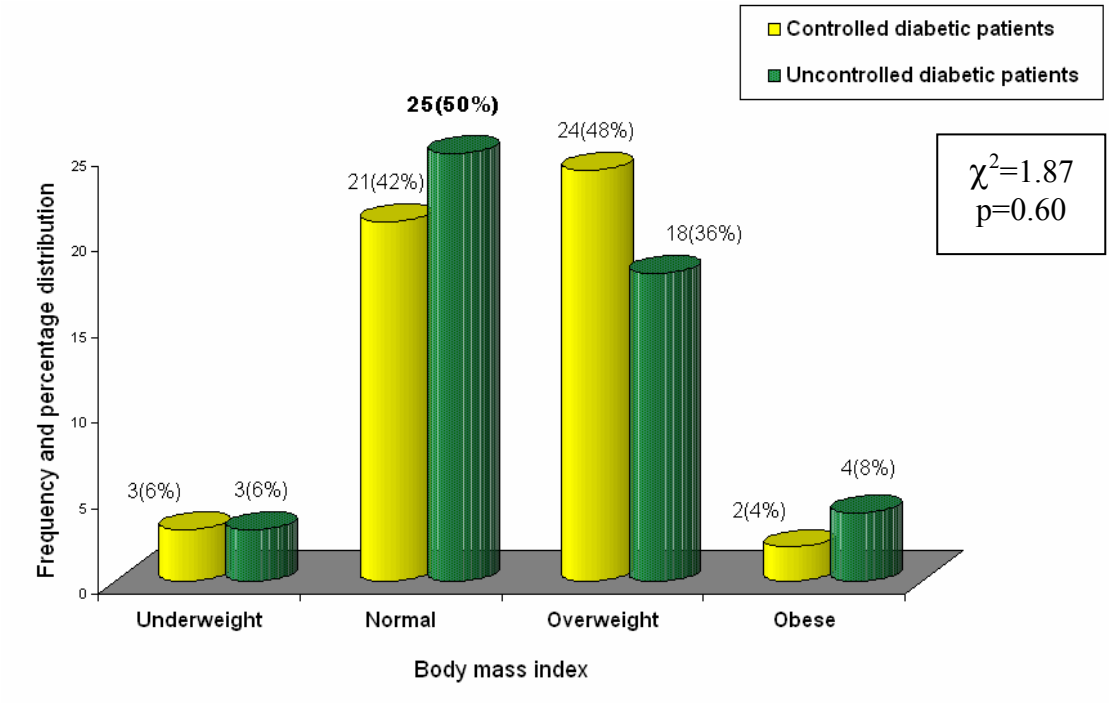
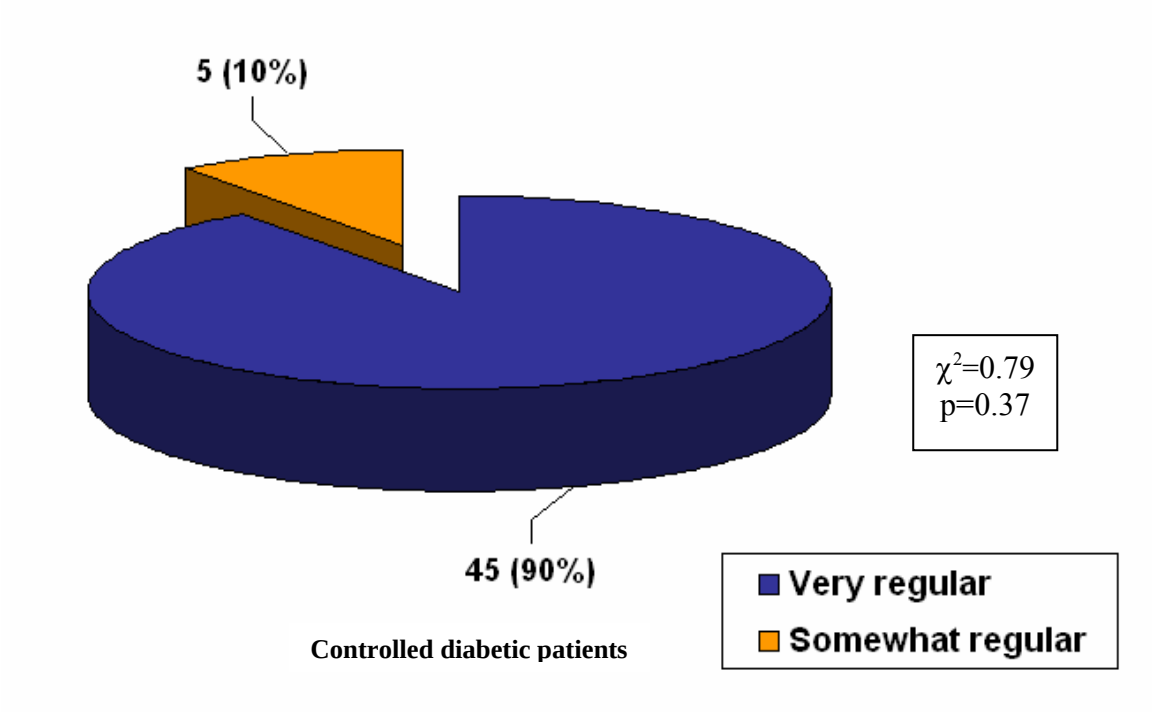


Fig. 7 : Frequency and percentage distribution of type 2 diabetic patients according to Body Mass Index

Figure 8 shows the frequency and percentage distribution of controlled and uncontrolled type 2 diabetic patients according to regularity of treatment for diabetes

Majority of controlled 45(90%) and uncontrolled 42(84%) type 2 diabetic patients were taking treatment very regularly and least among controlled 5(10%) and uncontrolled 8(16%) type 2 diabetic patients were taking treatment somewhat regularly. The obtained χ^2 value 0.79(p=0.37) was not significant. Therefore the group was comparable with regard to regularity of treatment.

It was inferred that majority of type 2 diabetic patients were taking treatment very regularly for diabetes.



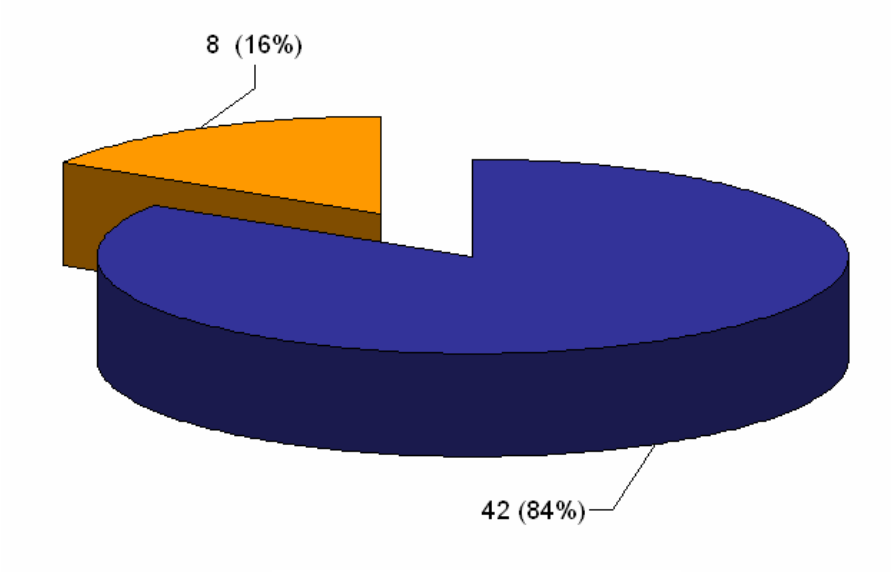


Fig. 8 : Frequency and percentage distribution of type 2 diabetic patients according to the regularity of treatment for diabetes

SECTION-II: DATA ON THE PHYSICAL ACTIVITIES AMONG TYPE 2 DIABETES PATIENTS WITH CONTROLLED AND UNCONTROLLED BLOOD SUGAR

For the purpose of the study, the following null hypotheses were stated.

H_{01}- There will be no significant difference in the physical activities between type 2 diabetic patients with controlled and uncontrolled blood sugar.

H_{02}- There will be no significant difference in the speed in physical activities between type 2 diabetic patients with controlled and uncontrolled blood sugar.

H_{03}- There will be no significant difference in the sweating during physical activities between type 2 diabetic patients with controlled and uncontrolled blood sugar.

TABLE: 2

Mean, S.D, Mean Difference and 't' value between physical activities and type 2 diabetes patients with controlled and uncontrolled blood sugar.

Physical activities	Type 2 diabetes				Mean difference	't' value
	Controlled blood sugar (n=50)		Uncontrolled blood sugar (n=50)			
	Mean time (mts)	S.D	Mean Time(mts)	S.D		
1.Daily activities	61.96	15.42	60.04	15.62	1.92	0.62 (p=0.54) NS
2.Personal activities	574.56	113.8	544.60	156.57	29.96	1.1 (p=0.28) NS
3.Housework	291.20	143.6	202.80	156.42	88.4	**2.93 (p=0.004) S**
4.Leisure activities	235.74	84.73	205.54	86.44	30.2	1.76 (p=0.08) NS
5.Exercise	39.78	36.97	20.00	23.34	19.78	**3.20 (p=0.002) S**
6.Travelling	22.46	34.37	9.70	20.81	12.76	**2.25 (p=0.03) S**
7.Occupation	159.40	163.0	158.30	162.98	1.10	0.03 (p=0.97) NS

S: Significant, NS: Non-significant

Table: 2 reveals the mean, S.D, mean difference and 't' value regarding the physical activities among type 2 diabetic patients with controlled and uncontrolled blood sugar.

The type 2 diabetic patients with controlled blood sugar significantly spent more time in housework t=2.93 ($p<0.05$), exercise t=3.20 ($p<0.05$) and traveling t=2.25 ($p<0.05$). Therefore, the null hypothesis was rejected.

However, there was no significant difference in the time spent by type 2 diabetic patients with controlled and uncontrolled blood sugar regarding daily activities, physical activities, leisure activities and occupation ($p>0.05$). Therefore, the null hypothesis was accepted.

It was inferred that type 2 diabetic patients with controlled blood sugar spent more time in housework, exercise and traveling.

TABLE: 3

Frequency, percentage and χ^2 distribution regarding speed in the activities among type 2 diabetes patients with controlled and uncontrolled blood sugar.

Speed in the activity	Type 2 Diabetes				χ^2
	Controlled blood sugar (n=50)		Uncontrolled blood sugar (n=50)		
	No.	%	No.	%	
1.Speed in daily activities					
a) Slow	5	10	6	12	0.22
b) Moderate	40	80	40	80	(p=0.97)
c) Fast	5	10	4	8	NS
2.Speed in sexual activity					1.23
a) Slow	15	30	17	34	(p=0.54)
b) Moderate	35	70	33	66	NS
3.Speed in housework					
a) Slow	5	10	4	8	**8.34**
b) Moderate	33	66	40	80	**(p=0.04)**
c) Fast	12	24	6	12	**S**
4.Speed in exercise					
a) Slow	8	16	19	38	**15.73**
b) Moderate	25	50	28	56	**(p=0.001)**
c) Fast	17	34	3	6	**S**
5.Speed in traveling					
a) Slow	36	72	37	74	0.43
b) Moderate	13	26	12	24	(p=0.93)
c) Fast	1	2	1	2	NS
6.Speed in occupation					
a) Slow	26	52	27	54	2.08
b) Moderate	23	46	23	46	(p=0.56)
c) Fast	1	2	-	-	NS

S: Significant NS: Non-significant

Table: 3 reveals the frequency, percentage and χ^2 distribution of speed in the activities among type 2 diabetes patients with controlled and uncontrolled blood sugar.

Regarding the *speed in daily activities*, majority of the controlled and uncontrolled type 2 diabetic patients 40(80%) equally reported moderate speed. The obtained χ^2 value 0.22(p=0.97) was not significant.

Regarding the *speed in sexual activity*, majority of controlled type 2 diabetic patients 35(70%) and uncontrolled type 2 diabetic patients 33(60%) reported moderate speed. The obtained χ^2 value was 0.22 (p=0.97) was not significant.

Regarding the **speed in housework**, majority of controlled and uncontrolled type 2 diabetic patients reported moderate speed 33(66%) and 40(80%) respectively. The obtained χ^2 value was 8.34(p=0.04) was significant.

Regarding the **speed in exercise**, majority of controlled 25(50%) and uncontrolled 28(56%) type 2 diabetic patients were doing exercise in a moderate speed. About 17(34%) of controlled and only 3(6%) of uncontrolled type 2 diabetic patients were reported fast speed. The obtained χ^2 value was 15.73(p=0.001) was significant.

Regarding the *speed in traveling*, majority of both controlled 36(72%) and uncontrolled 37 (74%) type 2 diabetic patients were reported slow speed. The obtained χ^2 value 0.43 (p=0.93) was not significant.

Regarding the *speed in occupation*, majority were reported slow speed among controlled 26(52%) and uncontrolled 27(54%) type 2 diabetic patients. The obtained χ^2 value 2.08 (p=0.56) was not significant.

It was inferred that there was significant association between the speed in housework & exercise and the control of blood sugar among type 2 diabetic patients.

TABLE: 4

Frequency, percentage and χ^2 distribution regarding sweating in the activities among type 2 diabetes patients with controlled and uncontrolled blood sugar

Sweating in activity	Type 2 Diabetes				χ^2
	Controlled blood sugar (n=50)		Uncontrolled blood sugar (n=50)		
	No.	%	No.	%	
1.Sweating in daily activities					4.167 (p=0.24) NS
a) Rarely or never	37	74	36	72	
b) Sometimes	13	26	11	22	
c) Always or often	-	-	3	6	
2.Sweating in personal activities					**9.181 (p=0.027) S**
a) Rarely or never	35	70	43	86	
b) Sometimes	13	26	4	8	
c) Always or often	2	4	3	6	
3. Sweating in housework					5.4 (p=0.14) NS
a) Rarely or never	6	12	7	14	
b) Sometimes	21	42	27	54	
c) Always or often	23	46	16	32	
4.Sweating in leisure activities					3.012 (p=0.39) NS
a) Rarely or never	43	86	43	86	
b) Sometimes	3	6	6	12	
c) Always or often	4	8	1	2	
5. Sweating in exercise					4.85 (p=0.18) NS
a) Rarely or never	14	28	22	44	
b) Sometimes	2	4	4	8	
c) Always or often	34	68	24	48	
6.Sweating in traveling					2.515 (p=0.473) NS
a) Rarely or never	36	72	40	80	
b) Sometimes	8	16	5	10	
c) Always or often	6	12	5	10	
7.Sweating in occupation					2.370 (p=0.499) NS
a) Rarely or never	22	44	27	54	
b) Sometimes	9	18	5	10	
c) Always or often	19	38	18	36	

S: Significant, NS: Non-significant

Table: 4 reveals the frequency, percentage and χ^2 distribution regarding sweating in the activities among type 2 diabetes patients with controlled and uncontrolled blood sugar level.

Regarding *sweating in daily activities*, majority of controlled and uncontrolled type 2 diabetic patients were rarely or never sweating 37(74%) and 36(72%) respectively. The obtained χ^2 value 4.167 (p=0.24) was not significant.

Regarding *sweating in personal activities*, more controlled type 2 diabetic patients 43(86%) never or rarely sweat than uncontrolled 35(70%). The obtained χ^2 value 9.181 (p=0.027) was significant.

Regarding *sweating in housework*, majority 23(46%) of controlled type 2 diabetic patients sweat always or often. Among uncontrolled type 2 diabetic patients, majority 27(54%) sweat sometimes. The obtained χ^2 value 5.41 (p=0.144) was not significant.

Regarding *sweating in leisure activities*, majority of both controlled 43(86%) and uncontrolled 43(86%) type 2 diabetic patients sweat rarely or never. The obtained χ^2 value 3.012 (p=0.39) was not significant.

Regarding the *sweating during exercise*, majority of controlled 34(68%) and uncontrolled 24(48%) type 2 diabetic patients sweat always or often. The obtained χ^2 value 4.852(p=0.183) was not significant.

Regarding *sweating in traveling,* majority among controlled 36(72%) and uncontrolled 40(80%) type 2 diabetic patients sweat rarely or never. The obtained χ^2 value 2.52 (p=0.473) was not significant.

Regarding *sweating in occupation*, majority among uncontrolled 27(54%) and uncontrolled 22(44%) type 2 diabetic patients sweat rarely or never. The obtained χ^2 value 2.370 (p=0.499) was not significant.

It was inferred that there was an association between sweating in personal activity and control of blood sugar among type 2 diabetic patients.

SECTION-III: DATA ON THE CORRELATION BETWEEN PHYSICAL ACTIVITIES AND THE BLOOD SUGAR, BODY MASS INDEX AMONG CONTROLLED AND UNCONTROLLED TYPE 2 DIABETIC PATIENTS

For the purpose of the study, the following null hypotheses were stated.

H_{04}: There will be no significant correlation between the physical activities and the post prandial blood sugar among controlled and uncontrolled type 2 diabetes patients.

H_{05}: There will be no significant correlation between the physical activities and body mass index among controlled and uncontrolled type 2 diabetes patients.

TABLE: 5

Mean, S.D and 'r' value on physical activities and post prandial blood sugar among controlled and uncontrolled type 2 diabetes patients.

Group	Type 2 diabetic patients					
	Controlled blood sugar (n=50)			Uncontrolled blood sugar (n=50)		
Mean post prandial blood sugar	*152.10*			*244.62*		
Physical activities	**Mean time (mts)**	**S.D**	**'r'**	**Mean time(mts)**	**S.D**	**'r'**
Daily activities	61.96	15.42	0.196 (p=0.172) NS	60.04	15.62	0.034 (p=0.816) NS
Personal activities	574.56	113.79	-0.114 (p=0.429) NS	544.60	156.6	0.034 (p=0.817) NS
Housework	291.20	143.62	0.043 (p=0.767) NS	202.80	156.4	-0.165 (p=0.251) NS
Leisure activities	235.74	84.73	-0.001 (p=0.995) NS	205.54	86.44	0.015 (p=0.916) NS
Exercise	39.78	36.97	**-0.282 (p=0.04) S**	20.00	23.34	0.103 (p=0.475) NS
Traveling	22.46	34.37	-0.228 (p=0.112) NS	9.70	20.81	-0.098 (p=0.499) NS
Occupation	159.40	162.95	-0.091 (p=0.53) NS	158.30	162.9	0.152 (p=0.292) NS

S: Significant, NS: Non-significant

Table: 5 reveals the correlation between the physical activities and post prandial blood sugar among the controlled and uncontrolled type 2 diabetes patients.

There was significant negative correlation between the time spent in exercise and controlled blood sugar among type 2 diabetic patients r= -0.282 (p=0.04).

However, there was no correlation between controlled blood sugar and time spent in daily activities, personal activities, housework, leisure activities, traveling and occupation among type 2 diabetic patients($p>0.05$).

There was no correlation between uncontrolled blood sugar and time spent in daily activities, personal activities, housework, leisure activities, exercise, traveling and occupation among type 2 diabetic patients($p>0.05$).

It was inferred that there was significant negative correlation between the exercise and the blood sugar among controlled type 2 diabetic patients.

TABLE: 6

Mean, S.D and 'r' value on physical activities and body mass index among controlled and uncontrolled type 2 diabetes patients.

Group	Type 2 diabetic patients					
	Controlled blood sugar (n=50)			Uncontrolled blood sugar (n=50)		
Mean body mass index	*24.5(3.5)*			*25.1(4.3)*		
Physical activities	**Mean time (mts)**	**S.D**	**'r'**	**Mean time(mts)**	**S.D**	**'r'**
Daily activities	61.96	15.42	0.27 (p=0.06) NS	60.04	15.62	0. 34 (p=0.02) S
Personal activities	574.56	113.79	-0.16 (p=0.28) NS	544.60	156.6	0.28 (p=0.05) NS
Housework	291.20	143.62	0.26 (p=0.06) NS	202.80	156.4	0.32 (p=0.83) NS
Leisure activities	235.74	84.73	0.23 (p=0.12) NS	205.54	86.44	**0.38 (p=0.007 S**
Exercise	39.78	36.97	**-0.41 (p=0.003) S**	20.00	23.34	0.08 (p=0.57) NS
Traveling	22.46	34.37	**-0.42 (p=0.002) S**	9.70	20.81	-0.09 (p=0.55) NS
Occupation	159.40	162.95	**-0.54 (p=0.001) S**	158.30	162.9	-0.09 (p=0.54) NS

S: Significant. NS: Non-significant

Table: 6 reveals the correlation between the physical activities and body mass index among the controlled and uncontrolled type 2 diabetes patients.

There was significant low negative correlation between BMI and exercise r=-0.41($p<0.01$), traveling r=-0.42 ($p<0.01$) and occupation r=-0.54 ($p<0.01$) among type 2 diabetic patients with controlled blood sugar.

There was significant low positive correlation between BMI and daily activities r=0.33 ($p=0.02$) and leisure activities r=0.38($p<0.01$) among type 2 diabetic patients with uncontrolled blood sugar.

It was inferred that there was significant negative correlation between exercise, traveling & occupation and BMI among controlled type 2 diabetic patients. And there was significant positive correlation between daily activities & leisure activities and BMI among uncontrolled type 2 diabetic patients.

SECTION-IV: DATA ON ASSOCIATION BETWEEN PHYSICAL ACTIVITIES, POST PRANDIAL BLOOD SUGAR AND SELECTED FACTORS AMONG TYPE 2 DIABETIC PATIENTS WITH CONTROLLED AND UNCONTROLLED BLOOD SUGAR.

For the purpose of the study, the following null hypotheses were stated.

H_{05}: There will be no significant association between selected factors and the physical activities among type 2 diabetic patients with controlled and uncontrolled blood sugar

H_{06}: There will be no significant association between selected factors and the post prandial blood sugar among type 2 diabetic patients with controlled and uncontrolled blood sugar.

TABLE: 7

Linear regression regarding the association between the physical activities and selected factors in type 2 diabetic patients with controlled and uncontrolled blood sugar.

Selected factors	Type 2 diabetic patients					
	Controlled blood sugar			Uncontrolled blood sugar		
	Standardized Co-efficient (β)	't' value	Significance (p<0.05)	Standardized Co-efficient(β)	't' value	Significance (p<0.05)
1. Age	0.07	0.46	0.65 (NS)	0.12	0.85	0.40 (NS)
2. Sex	- 0.2	-1.32	0.20 (NS)	0.1	0.73	0.40 (NS)
3. Marital status	0.04	0.26	0.80 (NS)	0.33	1.69	0.10 (NS)
4. Education	0.08	0.45	0.66 (NS)	-0.12	-0.88	0.38 (NS)
5. Occupation	0.1	0.53	0.60 (NS)	0.06	0.34	0.74 (NS)
6. Strain in job	0.12	0.77	0.45 (NS)	-0.38	-2.54	**0.015 (S)**
7. Duration of DM	0.28	1.86	0.07 (NS)	0.16	0.86	0.39 (NS)
8. Body Mass Index	-0.47	-3.65	**0.001 (S)**	0.26	1.85	0.07(NS)
9. Regularity of treatment	0.2	1.29	0.20 (NS)	-0.17	-0.99	0.33 (NS)

S : Significant NS : Non Significant

Table: 7 reveals the standardized co-efficient (β) and 't' value regarding the physical activities and selected factors among type 2 diabetic patients with controlled and uncontrolled blood sugar based on linear regression.

Body mass index was significantly associated with physical activities t= -3.65 (p=0.01) among type 2 diabetic patients with controlled blood sugar.

However, selected factors such as age, sex, marital status, education, occupation, strain in job, duration of diabetes and regularity of treatment had no association with physical activities among controlled type 2 diabetic patients (p>0.05).

Strain in job was significantly associated with physical activities t= -2.54 (p=0.015) among uncontrolled type 2 diabetic patients.

However, the other selected factors such as age, sex, marital status, education, occupation, duration of diabetes, body mass index and regularity of treatment had no association with physical activities among type 2 diabetic patients with uncontrolled blood sugar (p>0.05).

TABLE: 8

Linear regression regarding the association between the post prandial blood sugar and selected factors in type 2 diabetic patients with controlled and uncontrolled blood sugar.

Selected factors	Type 2 diabetic patients					
	Controlled blood sugar			Uncontrolled blood sugar		
	Standardized Co-efficient (β)	't' value	Significance (p<0.05)	Standardized Co-efficient(β)	't' value	Significance (p<0.05)
1. Age	-0.05	-0.3	0.77 (NS)	-0.173	-1.226	0.23 (NS)
2. Sex	0.03	0.15	0.88 (NS)	-0.248	-1.409	0.17 (NS)
3. Religion	-0.09	-0.5	0.62 (NS)	-0.241	-1.434	0.16 (NS)
4. Marital status	-0.02	-0.12	0.91 (NS)	-0.293	-1.456	0.15 (NS)
5. Education	0.08	0.38	0.71 (NS)	-0.193	-1.23	0.23 (NS)
6. Occupation	-0.09	-0.42	0.68 (NS)	-0.311	-1.518	0.14 (NS)
7. Strain in job	-0.24	-1.17	0.25 (NS)	0.102	0.651	0.52 (NS)
8. Duration of DM	-0.04	-0.23	0.82 (NS)	0.80	3.759	**0.001 (S)**
9. Body Mass Index	0.42	2.13	**0.04 (S)**	-0.233	-1.463	0.15 (NS)
10. Regularity of treatment	0.09	0.54	0.59 (NS)	0.338	1.791	0.08 (NS)
11. Average speed in activities	0.09	0.4	0.69 (NS)	-0.212	-0.915	0.37 (NS)
12. Average sweating in activities	-0.04	-0.2	0.84 (NS)	0.128	0.630	0.53 (NS)

S : Significant NS : Non Significant

Table: 8 reveals the standardized co-efficient (β) and 't' value regarding post prandial blood sugar and selected factors among type 2 diabetic patients with controlled and uncontrolled blood sugar based on linear regression.

Body mass index was significantly associated with post prandial blood sugar t= 2.13 (p=0.04) among type 2 diabetic patients with controlled blood sugar.

However, selected factors such as age, sex, religion, marital status, education, occupation, strain in job, duration of diabetes, regularity of treatment, average speed in activities and average sweating in activities had no association with postprandial blood sugar among controlled type 2 diabetic patients (p>0.05).

Duration of diabetes was significantly associated with post prandial blood sugar t= 0.8 (p=0.001) among uncontrolled type 2 diabetic patients.

However, the other selected factors such as age, sex, religion, marital status, education, occupation, strain in job, body mass index, regularity of treatment, average speed in activities and average sweating in activities had no association with post prandial blood sugar among type 2 diabetic patients with uncontrolled blood sugar(p>0.05).

Chapter – V

Summary, Findings, Discussion, Implications, Limitations, Recommendations & Conclusion

CHAPTER-V

SUMMARY, FINDINGS, DISCUSSION, IMPLICATIONS, LIMITATIONS, RECOMMENDATIONS AND CONCLUSION

The essence of any research study lies in reporting and findings. This chapter is devoted to the summary, findings, limitations, interpretation of the findings and recommendations that incorporate the implications of the study.

SUMMARY

The primary aim of the study was to analyze the physical activities of type 2 diabetic patients with controlled and uncontrolled blood sugar.

The objectives were (1) To compare the physical activities among type 2 diabetic patients with controlled and uncontrolled blood sugar. (2) To find the correlation between the physical activities and the post prandial blood sugar, body mass index among type 2 diabetic patients with controlled and uncontrolled blood sugar. (3) To determine the significant association between the physical activities, postprandial blood sugar and selected factors among the type 2 diabetic patients with controlled and uncontrolled blood sugar.

The study attempted to examine the following research hypotheses:

H_1- There will be a significant difference in the physical activities between type 2 diabetic patients with controlled and uncontrolled blood sugar.

H_2- There will be a significant difference in the speed in physical activities between type 2 diabetic patients with controlled and uncontrolled blood sugar.

H_3- There will be a significant difference in the sweating during physical activities between type 2 diabetic patients with controlled and uncontrolled blood sugar.

H_4- There will be a significant correlation between the physical activities and the post prandial blood sugar among type 2 diabetic patients with controlled and uncontrolled blood sugar.

H_5- There will be a significant correlation between the physical activities and body mass index among type 2 diabetic patients with controlled and uncontrolled blood sugar.

H_6-There will be a significant association between the physical activities and selected factors among type 2 diabetic patients with controlled and uncontrolled blood sugar.

H_7- There will be a significant association between selected factors and post prandial blood sugar among type 2 diabetic patients with controlled and uncontrolled blood sugar.

The review of literature on related studies helped the investigator to design the methodology, conceptual framework and to develop the tool. The literature review was done for the present study under the headings: (1) Studies related to the physical activities among type 2 diabetic patients. (2) Studies related to the physical activities in the control of blood sugar among type 2 diabetic patients.

The investigator developed a conceptual framework based on Structure Process Outcome Model. The research design adopted for the study was descriptive, comparative in nature. Setting chosen for the study was Vijaya Hospital, Kottarakkara, Kerala.

The dependent variable was post prandial blood sugar of type 2 diabetic patients. The independent variables were time taken for the physical activities, speed in the activities and the sweating in activities.

The associate variables were age, sex, religion, marital status, education, monthly income, occupation, strain in job, location of residence, duration of diabetes mellitus, regularity of treatment and regularity of checking blood sugar.

Samples were selected through purposive sampling (50 controlled and 50 uncontrolled type 2 diabetic patients).

The tool used was a self-reporting semi structured questionnaire to collect the data regarding the physical activities among type 2 diabetic patients, consisted of 2 sections. Part I consisted of data regarding the background variables of type 2 diabetic patients and part II consisted of activity analysis of type 2 diabetic patients.

The translation of the tool and content validity of the tool was obtained from 3 nursing experts and 1 diabetologist. The reliability of the tool was established by test-retest method. The reliability co-efficient r= 0.76, was high.

The pilot study was conducted in the OPD of Vijaya Hospital, Kottarakkara and the study was found to be feasible.

The main study was conducted in Vijaya Hospital, Kottarakkara, Kerala after getting the permission from the hospital authorities. Purposive sampling was used to select the samples and informed consent was obtained from the samples. Data were collected for 4 weeks in the month of October 2009. The patients were very co-operative and showed interest in answering the tool. Data analysis and interpretation were done based on the objectives, SPSS version 10.0 was used. A probability of less than 0.05 was considered to be significant.

CHARACTERISTICS OF STUDY SAMPLES

Majority of type 2 diabetic patients with controlled and uncontrolled blood sugar aged 51-60 yrs [33(66%), 32(64%)]; were females[29(58%), 25(50%)]; were Hindus[24(48%), 23(46%)]; were married [49(98%); 49(98%)]; were educated up to high school [17(34%), 29(58%)]; were above poverty line [49(58%), 50(100%)]; belonged to rural area [50(100%), 48(96%)]; were semiskilled labourers [20(40%), 24(48%)]; had physical strain in job [23(46%), 24(48%)]; had diabetes 2-5 years [33(66%), 32(64%)]; were taking treatment very regularly [45(90%), 42(84%)] and were checking the blood sugar once in a month [50(100%), 49(98%)] respectively.

FINDINGS

The findings of the study were presented under the following headings based on the objectives of the study.

Objective 1: To compare the physical activities among type 2 diabetic patients with controlled and uncontrolled blood sugar.

- Type 2 diabetic patients with controlled blood sugar spent more time in housework $t=2.93$ ($p<0.05$); exercise $t=3.20$ ($p<0.05$) and traveling $t=2.25$ ($p<0.05$).
- There was no significant difference in the time spent by type 2 diabetic patients with controlled and uncontrolled blood sugar regarding daily activities, physical activities, leisure activities and occupation ($p>0.05$).
- There was significant association between the speed in housework $\chi^2 = 8.34$ ($p=0.04$) & exercise $\chi^2 = 15.73$($p=0.001$) and the control of blood sugar among type 2 diabetic patients.

- There was an association between sweating in personal activity χ^2 = 9.181 (p=0.027) and control of blood sugar among type 2 diabetic patients.

Objective 2: To find the correlation between the physical activities and the post prandial blood sugar, body mass index of type 2 diabetic patients with controlled and uncontrolled blood sugar.

- There was significant negative correlation between the time spent in exercise and controlled blood sugar among type 2 diabetic patients r= -0.282 (p=0.04).
- There was no correlation between controlled blood sugar and time spent in daily activities, personal activities, housework, leisure activities, traveling and occupation among type 2 diabetic patients(p>0.05).
- There was no correlation between uncontrolled blood sugar and time spent in daily activities, personal activities, housework, leisure activities, exercise, traveling and occupation among type 2 diabetic patients(p>0.05).
- There was significant negative correlation between exercise, traveling & occupation and BMI among controlled type 2 diabetic patients.
- There was significant positive correlation between daily activities & leisure activities and BMI among uncontrolled type 2 diabetic patients.

Objective 3: To determine the significant association between the physical activities, postprandial blood sugar and selected factors among the type 2 diabetic patients with controlled and uncontrolled blood sugar.

- Body mass index was significantly associated with physical activities t= -3.65 (p=0.01) among type 2 diabetic patients with controlled blood sugar.

- Selected factors such as age (t=0.46); sex (t=-1.3); marital status (t=0.26); education; (t=0.45); occupation (t=0.53); strain in job (t=0.77); duration of diabetes (t=1.86) and regularity of treatment (t=1.29) had no association with physical activities among controlled type 2 diabetic patients (p>0.05).
- Strain in job was significantly associated with physical activities t= -2.54 (p=0.015) among uncontrolled type 2 diabetic patients.
- Selected factors such as age (t=0.85); sex (t=0.73); marital status (t=1.7); education (t=-0.8); occupation (t=0.3); duration of diabetes (t=0.86); body mass index (t=1.8) and regularity of treatment (t=-0.99) had no association with physical activities among type 2 diabetic patients with uncontrolled blood sugar (p>0.05).
- Body mass index was significantly associated with post prandial blood sugar t= 2.13 (p=0.04) among type 2 diabetic patients with controlled blood sugar.
- Selected factors such as age(t=-0.3); sex(t=0.15); religion(t=-0.5); marital status (t=-0.12); education (t=0.38); occupation (t=-0.42); strain in job (t=-1.17); duration of diabetes (t=-0.23); regularity of treatment (t=0.54); average speed in activities (t=0.4) and average sweating in activities (t=-0.2) had no association with postprandial blood sugar among controlled type 2 diabetic patients (p>0.05).
- Duration of diabetes was significantly associated with post prandial blood sugar t= 0.8 (p=0.001) among uncontrolled type 2 diabetic patients.
- Selected factors such as age(t=-1.23); sex(t=-1.4); religion(t=-1.4); marital status (t=-1.45); education(t=-1.23); occupation(t=-1.5); strain in job(t=0.65); body mass index(t=-1.46); regularity of treatment (t=1.79); average speed in activities(t=-0.9) and average sweating in activities(t=0.63) had no association with post prandial blood sugar among type 2 diabetic patients with uncontrolled blood sugar(p>0.05).

DISCUSSION

The results of the study were discussed based on the findings of the study.

Finding 1: Findings on the comparison of the physical activities among type 2 diabetic patients with controlled and uncontrolled blood sugar.

- Type 2 diabetic patients with controlled blood sugar spent more time in housework $t=2.93(p<0.05)$; exercise $t=3.20(p<0.05)$ and traveling $t=2.25(p<0.05)$.

The above findings were supported by the studies of **Seyyednozadi et al (2007)** found that recommended physical activity had significant effect in decreasing FBS, 2hrs PPBS and HbA1c**, Bossoni .S et al (2007)** found that diabetic patients with poorly controlled diabetes had Instrumental Activities of Daily Living disability score was significantly higher than diabetic patients with well-controlled disease and normal subjects and **Boule et al (2001)** found that structured exercise programs had a statistically significant beneficial effect on glycemic control as post intervention HbA1c was lower in exercise than control groups.

- There was no significant difference in the time spent by type 2 diabetic patients with controlled and uncontrolled blood sugar regarding daily activities, physical activities, leisure activities and occupation ($p>0.05$).

The above findings were contradicted by the study of **Villegas et al (2000)** showed that participants with the highest level of daily and leisure physical activities were at lower risk than those with low levels of activities.

- There was significant association between the speed in housework χ^2 =8.34(p=0.04) & exercise χ^2 =15.73(p=0.001) and the control of blood sugar among type 2 diabetic patients.

The above findings were supported by the studies of **Johnson et al (2003)** showed that the cohort does not meet the walking speed of 4 Km/h, which is commonly accepted as moderately intense physical activity and **Mohan. V et al (2003)** found that the prevalence of diabetes and glucose intolerance was significantly higher among subjects with light grade activity compared to moderate and heavy grade activity.

- There was an association between sweating in personal activity χ^2 =9.181 (p=0.027) and control of blood sugar among type 2 diabetic patients.

The above finding was supported by the study of **Hu. F. B et al (1999)** stated that among women who did not perform vigorous activity, the relative risks of type 2 diabetes were statistically significant with the physical activity of lesser intensity and duration.

Finding 2: Findings on the correlation between the physical activities and the post prandial blood sugar, body mass index of type 2 diabetic patients with controlled and uncontrolled blood sugar.

- There was significant negative correlation between the time spent in exercise and controlled blood sugar among type 2 diabetic patients r= -0.282 (p=0.04).

The above findings were supported by the studies of **Sigal .J et al (2007)** found that either aerobic or resistance training improves glycemic control in type 2 diabetic patients but the improvements were greatest with combined exercise training, **Sivananda et al (2007)** revealed in their study that there was significant decrease in PPBS after treadmill exercise as

supplement to diet and drug and **Pigman .T et al (2002)** found that patients without regular exercise were 2.71 times more likely than patients with regular exercise to have poor diabetic control.

- There was no correlation between controlled blood sugar and time spent in daily activities, personal activities, housework, leisure activities, traveling and occupation among type 2 diabetic patients($p>0.05$).

The above findings were contradicted by the studies of **Bossoni .S et al (2007)** found that diabetic patients with poorly controlled diabetes had Instrumental Activities of Daily Living disability score was significantly higher than diabetic patients with well-controlled disease and normal subjects and **Villegas et al (2000)** found that household activity was associated with a lower risk of diabetes in non-employed and with a higher risk in currently employed participants.

- There was no correlation between uncontrolled blood sugar and time spent in daily activities, personal activities, housework, leisure activities, exercise, traveling and occupation among type 2 diabetic patients ($p>0.05$).

The above findings were contradicted by the studies of **Ansari. M et al (2007)** found that physical activity in leisure time exercise or daily activity reduces the risk of type 2 diabetes in a high risk population and **Mohan. V et al (2003)** found that the prevalence of diabetes was significantly higher among subjects with light grade activity compared to moderate and heavy grade activity. And moderate & light activity showed a strong association with glucose tolerance.

- There was significant negative correlation between exercise, traveling & occupation and BMI among controlled type 2 diabetic patients.

The above finding was supported by the study of **Siegel. C (2008)** found that the active men with normal and overweight BMIs had lower diabetes hazards then the inactive men.

- There was significant positive correlation between daily activities & leisure activities and BMI among uncontrolled type 2 diabetic patients.

Finding 3. Findings on the significant association between the physical activities, postprandial blood sugar and selected factors among the type 2 diabetic patients with controlled and uncontrolled blood sugar.

- Body mass index was significantly associated with physical activities t= -3.65 (p=0.01) among type 2 diabetic patients with controlled blood sugar.

The above finding was supported by the study of **Meisinger. C et al (2004)** found that the protective effect of moderate to high physical activity was significant in women with a BMI below 30 kg/m^2 but not in diabetic women with a BMI of 30 kg/m^2 or higher, to the incidence of diabetes.

- Selected factors such as age (t=0.46); sex (t=-1.3); marital status (t=0.26); education (t=0.45); occupation (t=0.53); strain in job (t=0.77); duration of diabetes (t=1.86) and regularity of treatment (t=1.29) had no association with physical activities among controlled type 2 diabetic patients (p>0.05).

The above findings were supported by the study of **Ansari. M et al (2007)** found that the relationship between physical activity and reduced risk of diabetes adjusted for age and BMI was statistically significant only in women.

- Strain in job was significantly associated with physical activities t= -2.54 (p=0.015) among uncontrolled type 2 diabetic patients.

- Selected factors such as age (t=0.85); sex (t=0.73); marital status (t=1.7); education (t=-0.8); occupation (t=0.3); duration of diabetes (t=0.86); body mass index (t=1.8) and regularity of treatment (t=-0.99) had no association with physical activities among type 2 diabetic patients with uncontrolled blood sugar (p>0.05).

The above findings were supported by the study of **Kriska. M et al (1999)** found that measures of obesity and glucose tolerance were significantly correlated with activity levels.

- Body mass index was significantly associated with post prandial blood sugar t= 2.13 (p=0.04) among type 2 diabetic patients with controlled blood sugar.

The above finding was supported by the studies of **Meisinger. C et al (2004)** found that the protective effect of moderate to high physical activity was significant in women with a BMI below 30 kg/m^2 but not in diabetic women with a BMI of 30 kg/m^2 or higher, to the incidence of diabetes and **Shah. A (2004)** revealed that BMI of the diabetic subjects was found to be higher than the non-diabetic subjects.

IMPLICATIONS

The findings of the study have the following implications in nursing.

- Type 2 diabetic patients can be encouraged to spend more time in housework and exercise.
- Type 2 diabetic patients must do the physical activities with atleast moderate speed.
- Type 2 diabetic patients must do the physical activities in such a way that they sweat.

- Type 2 diabetic patients must be motivated to spend more time in exercise, traveling and occupation to reduce the body mass index and to control the blood sugar.
- Nurses can plan a schedule of exercises and housework for the type 2 diabetic patients.
- Nurses can promote physical activities especially housework and exercise in the homecare management of diabetic patients.
- Nurses can encourage physical activity as it is more economical than the pharmacological treatment for type 2 diabetes.

PERSONAL EXPERIENCE

1. The investigator has gained a lot of new information and experience through out the study.
2. The investigator did not have any problems in selecting the samples.
3. All the samples participated in the study understood the purpose and nature of the study and they were very co-operative.
4. Apart from the struggles and tensions of doing research to the investigator, this research was very interesting and helpful.

LIMITATIONS

1. Sample size requires increase in number.
2. The research tool used was self-reporting questionnaire.
3. The period of the study was very short.
4. Purposive sampling was used.
5. Subjective error caused by measuring the time taken for the physical activities, speed in the activities and sweating in activities were beyond the control of the investigator.

RECOMMENDATIONS

1. A similar study can be conducted on a larger sample in a different place to validate the findings of the study and to assess the applicability of the tool.
2. An interventional study can be conducted to assess the effectiveness of physical activities in the control of blood sugar in type 2 diabetic patients.
3. A similar study can be conducted on a larger sample for a long duration by using the continuous activity records.
4. A similar study can be conducted among type 2 patients using interview schedule.
5. An interventional study can be conducted to assess the effectiveness of postprandial walking in the control of blood sugar in type 2 diabetic patients.

CONCLUSION

The study concluded that type 2 diabetic patients with controlled blood sugar spent more time for exercise. More time taken for exercise and housework helps in the control of blood sugar and BMI among type 2 diabetic patients. Moderate speed and increased sweating in the activities also promotes the reduction in the blood sugar in diabetic patients. So nurses have to encourage the diabetic patients to use more time in housework and exercise which in turn prevents the complications of diabetes.

Bibliography

BIBLIOGRAPHY

BOOKS

1. Barabara. K. Timby (2007), **"Introductory Medical-Surgical Nursing"**, London, Lippincott Williams & Wilkins.
2. Best. W. John & Kahn. V. James (2002), **"Research in Education"**, New Jersey, Prentice Hall.
3. Basavanthappa. B. T (1998), **"Nursing Research"**, New Delhi, Jaypee Brothers.
4. Donna. D. Jgnatavicins (2006), **"Medical-Surgical Nursing"**, USA, Elsevier Saunder's Company.
5. Fox. .D.S (1970), **"Fundamentals of Research in Nursing"**, New York, Appleton.
6. Gupta. S. P (2002), **"Statistical Methods"**, New Delhi, Sultan Chand & Sons Publishers.
7. Harkness Nincher (1999), **"Medical-Surgical Nursing: Total Patient Care"**, Philadelphia, Mosby Publications.
8. Idolia Cox Colier(1998), **"Medical-Surgical Nursing"**, Sydney, Mosby Publications.
9. Kothari.C. R (2004), **"Research Methodology: Methods & Techniques"**, New Delhi, New Age International Publishers.
10. Mahajan. B. K (1991), **"Methods in Biostatistics"**, New Delhi, Jaypee Brothers.
11. Nichola. A. Boon (2006), **"Davidson's Principles and Practice of Medicine"**, New York, Churchill Livingstone.
12. Pareek Bharat & Sharma Shivani (2009), **"A Text Book of Nursing Research and Statistics"**, Jaladhar, S. Vikas & Co. Publishers.
13. Polit & Hungler (1999), **"Nursing Research: Principles and Methods"**, Philadelphia, J.B. Lippincott Company.
14. Rick Daniels (2007), **"Contemporary Medical- Surgical Nursing"**, Haryana, Sanal Printers.

15. Rao Sundar & Richard. J (1999), **"An Introduction to Biostatistics"**, New Delhi, Prentice Hall Pvt. Ltd.
16. Royle. A. Joan & Watsh Mike (1993), **"Watson's Medical Surgical Nursing and Related Physiology"**, London, W.B. Saunder's Company.
17. Sharon. L. Lewis (2007), **"Medical-Surgical Nursing"**, New York, Mosby Elsevier.
18. Swaminathan. M (2007), **"Handbook of Food & Nutrition"**, Bangalore, The Bangalore Printing & Publishing Company.
19. Suddharth & Brunner (2001), **"Text Book of Medical-Surgical Nursing"**, Philadelphia, Lippincott Company.
20. Siedel. M et al (1995), **"Mosby's Guide to Physical Examination"**, New York, Mosby Publications.
21. Snedecor. W. George& Cochian. G. William (1994), **"Statistical Methods"**, New Delhi, East West Press.
22. Suitor. W. J. Carol & Crowley. F. Merrily (1984), **"Nutrition: Principles and Application in Health Promotion"**, Philadelphia, Lippincott Company.
23. Treece. E. W & Treece. J. W, (1986), **"Elements of Research in Nursing"**, Saint Louis, Mosby Publications.
24. Wilma. P. Phiph (1998), **"Medical-Surgical Nursing"**, London, Mosby Publications.

JOURNALS

1. Ansari. M et al (2009), "Effect of Physical Activity and Obesity on Type 2 Diabetes in a Middle Aged Population", Journal of Environmental and Public Health, 10(1), Pp: 1-5.
2. Armstrong. G & Lavery. A (2004), "Variability in Activity May Precede Diabetic Foot Ulceration", Diabetes Care, 27(8), Pp: 1980-1984.
3. Alan.L (2002), "Improving Glycemic Control in Adults with Diabetes Mellitus: Shared Responsibility in Primary Care Practices", South Medical Journal, 95(7), Pp:684-690.

4. Armstrong. G et al (2001), “Continuous Activity Monitoring in Persons at High Risk for Diabetes Related Lower Extremity Amputation”, Journal of the American Podiatric Medical Association, 91(9), Pp: 451-455.
5. Bossom. S et al (2008), “Relationship Between Instrumental Activities Of Daily Living And Blood Glucose Control In Elderly Subjects With Type 2 Diabetes Mellitus”, Age & Ageing, 37(2), Pp: 222-224.
6. Boule. N. G et al (2001), “Effect of Exercise on Glycemic Control and Body Mass in Type 2 Diabetes Mellitus: A Meta Analysis of Controlled Clinical Trials”, The Journal of American Medical Association, 286(1), Pp: 1218-1227.
7. Colberg. R.S (2009), “Postprandial Walking is better for Lowering the Glycemic Effect of Dinner than Pre-Dinner Exercise in Type 2 Diabetic Individuals”, Journal of the American Medical Directors Association ,10(6), Pp: 394-397.
8. Eriksson. K.F (1991), “Prevention of Type 2 Diabetes Mellitus by Diet and Physical Exercise: The 6 Year Malmo Feasibility Study”, Diabetologia, 34 (12), Pp: 891-898.
9. Fretts. M (2009), “Physical Activity and Incidence of Diabetes in American Indians: A Strong Heart Study”, American Journal of Epidemiology, 170(5), Pp: 632-639.
10. Gleesonkreig. M (2006), “Self-Monitoring of Physical Activity: Effects on Self-Efficacy and Behaviour in People with Type 2 Diabetes”, The Diabetes Educator, 32(1), Pp: 69-77.
11. Hu. F. B et al (2001), “The Physical Activity and Incidence of Type 2 Diabetes”, The Journal of the American Medical Association, 282(15), Pp: 1433-1439.
12. Johnson. T (2005), “Measuring Habitual Walking Speed of People with Type 2 Diabetes”, Diabetes Care, 28(6), Pp: 1503-1504.
13. Kriska. M et al (2006), “Physical Activity in Individuals at Risk for Diabetes: Diabetes Prevention Program”, Medicine and Science in Sports and Exercise, 38(5), Pp: 826-832.

14. Lindstrom. J et al (2003), "The Finnish Diabetes Prevention Study: Lifestyle Intervention and 3 Year Results on Diet and Physical Activity", Diabetes Care, 26(12), Pp: 3230-3236.
15. Mohan. V, Shanthirani. C. S & Deepa. R (2009), "Glucose Intolerance in a Selected South Indian Population with Reference to Family History, Obesity and Physical Activity- The Chennai Urban Population Study", The Journal of the Association of Physicians of India, 51(1), Pp: 771-777.
16. Meisinger. C et al (2005), "Leisure-Time Physical Activity and the Risk of Type 2 Diabetes in Men and Women from the General Population", Diabetologia, 48(1), Pp: 27-34.
17. Manson. J. E et al (1992), "A Prospective Study of Exercise and Incidence of Diabetes among U. S Male Physicians", The Journal of American Medical Association, 268(1), Pp: 63-67.
18. Manson. J E. et al (1991), "Physical Activity and Incidence of NIDDM in Women", LANCET, 338(1), Pp: 774-778.
19. Pigman. T, Gan. X & Krouselwood. A (2002), "Role of Exercise for Type 2 Diabetic Patients Management", South Medical Journal, 95(1), Pp: 11-16.
20. Pan. X. R et al (1997), "Effects of Diet and Exercise in Preventing NIDDM in People with Impaired Glucose: the Da Qing IGT & Diabetes Study", Diabetes care, 20(1), Pp: 537-544.
21. Siegel. C et al (2008), "Physical Activity, Body Mass Index and Diabetes Risk in Men: A Prospective Study", The American Journal of Medicine, 122(12), Pp: 1115-1121.
22. Seyyednozadi et al (2008), "Role of Physical Activity and Nutrition in Controlling Type 2 Diabetes Mellitus", Journal of Biological Sciences, 8(4), Pp: 794-798.
23. Sivananda. N, Arun. M & Manjunath. H (2005), "The Influence of Aerobic Treadmill Exercise on Blood Glucose Homeostasis in NIDDM Patients", Indian Journal of Clinical Biochemistry, 20(11), Pp: 47-51.

24. Shah. A (2006), "A Comparative Study of Body Mass Index in Diabetic and Non-Diabetic Individuals in Nepalese Population", Kathmandu University Medical Journal, 4(1), Pp: 4-10.
25. Sigal. J et al (2004), "Physical Activity/ Exercise and Type 2 Diabetes", American Diabetes Association: Diabetes Care, 27(10), Pp: 2518-2539.
26. Villegas et al (2006), "Physical Activity and the Incidence of Type 2 Diabetes in the Shangai Women's Health Study", International Journal of Epidemiology, 35(6), Pp: 1553-1562.
27. Waden et al (2005), "Leisure Time Physical Activity is Associated with Poor Glycemic Control in Type 1 Diabetic Women: The Finn Dane Study", Diabetes Care, 28(4), Pp: 777-782.

UNPUBLISHED THESIS

1. Priscilla. M. N (2004), "A Cross-Sectional Study to Determine the Influencing Factors, the Clinical Variables and Demographic Variables in Patients with Type II Diabetes Mellitus Attending the Integrated Diabetes Clinic at CMC, Vellore".

SECONDARY SOURCES

1. Mary. J (2002), "A Study to Assess the Level of Knowledge of Diabetes Mellitus among Diabetic Patients in a Selected Hospital at Erode District".
2. Kumari (2006), "A Study to Assess the Effectiveness of Structured Teaching Programme Regarding Prevention of Foot Ulcer among Patients with Diabetes Mellitus at a Selected Hospital in Kanyakumari District".
3. Shaini. G. S (2006), "Effectiveness of Structured Teaching Programme on Home Care Management of Diabetes Mellitus in Apollo Hospital, Chennai".

INTERNET SOURCES

1. www.google.com
2. www.yahoo.com
3. www.pubmed.com
4. www.medscape.com
5. www.medline.com
6. www.sciencedirect.com
7. www.nursingcenter.com
8. www.naturalhealthperspective.com
9. www.diabetesjournal.org

Appendices

APPENDIX – I

LETTER REQUESTING OPINION AND SUGGESTION OF EXPERTS FOR ESTABLISHING CONTENT VALIDITY OF RESEARCH TOOL

From

30083604

II year M Sc Nursing

Annai JKK Sampoorani Ammal College of Nursing,

Komarapalayam- 638183, Namakkal district.

To

Through

The Dean,

Annai JKK Sampoorani Ammal College of Nursing,

Komarapalayam- 638183.

Respected madam/sir,

(Sub: Letter consent for validating the tool)

I am 30083604, II year M Sc Nursing student of Annai J.K.K Sampoorani Ammal College of nursing, Komarapalayam, under the Tamil Nadu Dr.M.G.R Medical University, Chennai.

As a partial fulfillment of M.Sc Nursing programme, I am conducting *"A Study on the Physical Activities among Type 2 Diabetes Patients with Controlled and Uncontrolled Blood Sugar in a Selected Hospital, Kerala".*

Here with I am sending the tool for the content validity for your expert opinion. I humbly request yourself to spare a little of your valuable time for me for which I remain ever grateful to you.

Thanking you

Place: Komarapalayam Yours sincerely

Date: 30083604

APPENDIX - II

CONTENT VALIDITY CERTIFICATE

I, hereby certify that I have validated the tool of 30083604, II year M Sc Nursing student of Annai J.K.K Sampoorani Ammal College of Nursing, Komarapalayam, who is undertaking the following study

"A Study on the Physical Activities among Type 2 Diabetes Patients with Controlled and Uncontrolled Blood Sugar in a Selected Hospital, Kerala".

Place: Signature of the Expert

Date: Designation

APPENDIX III

LIST OF EXPERTS

1. Prof. (Mrs.) Jessie Sudharsanam M Sc.(N)
   HOD, Medical- Surgical Nursing
   Annai J.K.K Sampoorani Ammal College of Nursing
   Komarapalayam.

2. Dr. Premlal. A.P MBBS, MS, D(DIAB), MRCS
   Asst. Professor
   Govt. Medical College
   Trivandrum.

3. Mrs. Jessy Kutty. M.P., M Sc.(N) (Med. Surg)
   Associate Professor
   Mercy College of Nursing, Valakom
   Kottarakkara, Kerala.

4. Ms. Shobhana. M Sc.(N) (Med. Surg)
   Asst. Professor
   Annai J.K.K Sampoorani Ammal College of Nursing
   Komarapalayam.

APPENDIX-IV

LETTER SEEKING PERMISSION TO CONDUCT THE RESEARCH STUDY.

From

30083604
II year M. Sc (Nursing)
Annai J. K. K. Sampoorani Ammal college of Nursing,
Komarapalayam - 638183.
Namakkal (dist)

To

Through,

The Dean,
Annai J. K. K. Sampoorani Ammal College of Nursing,
Komarapalayam - 638183.

Sub: Seeking permission to conduct the research study.

Respected Sir,

I am 30083604, II year M.Sc. Nursing student of Annai J.K.K.Sampoorani Ammal College of Nursing, Komarapalayam, under the Tamil Nadu Dr. MGR Medical University, Chennai.

I would like to bring to your kind notice that as a partial fulfillment of M.Sc. Nursing programme, I am conducting "*A Study on the Physical Activities among Type 2 Diabetes Patients with Controlled and Uncontrolled Blood Sugar in a Selected Hospital, Kerala".*

I would like to conduct this research study in your esteemed Hospital. Hence I request you to kindly grant permission for the same.

Thanking you,

Place: Komarapalayam
Date:

Yours faithfully,
30083604

APPENDIX –V

PERMISSION LETTER TO CONDUCT THE RESEARCH STUDY

VIJAYA HOSPITAL

KOTTARAKARA, Kollam, Kerala, India - 691531.
Phone: 0474-2651823, 2650856, Fax : 2650064
E-mail : vijayaktr@yahoo.co.in, Website: www.vijayahospital.net

Date.....

26.09.2009

To
The Dean,
Annai J.K.K. Sampoorani Ammal College of Nursing,
Komarapalayam - 638183.

Sub : Permission for conducting the Research Study.

Sir,

I, hereby granted permission to conduct the research in our esteemed institution, to 30083604. II, M.Sc. Nursing, who is undertaking the following study.

"A Study on the Physical Activities among type 2 Diabetes patients with controlled and uncontrolled Blood Sugar in a Selected Hospital, Kerala.

Thanking you,

Yours sincerely,

Dr.V.S.RAJEEV M.S. (ENT)
DIRECTOR
VIJAYA HOSPITAL
KOTTARAKARA

APPENDIX –VI

INFORMED CONSENT FORM

I,_____ understand that I am being asked to participate in a research study conducted by 30083604, M Sc (N) II year from Annai J.K.K Sampoorani Ammal College Of Nursing, Komarapalayam on *"A Study on the Physical Activities of Type 2 Diabetic Patients with Controlled and Uncontrolled Blood Sugar in Vijaya Hospital, Kottarakkara".* The study has been explained to me. I have been informed that I can with draw from the study at any time. I have fully understood the proceeding and give my consent to conduct the study.

Signature of the subject: Date:

Signature of the subject: Date:

APPENDIX-VII

QUESTIONNAIRE ON ACTIVITY ANALYSIS OF TYPE 2 DIABETIC PATIENTS

Code No: ----------

PART – I: BACKGROUND VARIABLES

Instruction: This section contains questions regarding your background. Kindly tick (✓) mark for the appropriate answer. Please answer all questions.

1) Age (in yrs):
   a) 41-50 □
   b) 51-60 □

2) Sex
   a) Male □
   b) Female □

3) Religion:
   a) Hindu □
   b) Christian □
   c) Muslim □
   d) Others □

4) Marital status:
   a) Unmarried □
   b) Married □
   c) Widow/widower □
   d) Divorced □

5) Education:

a) Primary school □

b) Upper primary school □

c) High school □

d) Pre-degree □

e) Graduate □

f) Post graduate and above □

6) Monthly income:

a) Above poverty line □

b) Below poverty line □

7) State your occupation.

a) Professional (Eg: doctor, lawyer, teacher) □

b) Skilled manual (Eg: master builder,carpenter,nurse) □

c) Skilled manual-low grade (Eg: electrician,plumper) □

d) Semiskilled (Eg: farmer, fitter, housewife, driver) □

e) Unskilled (Eg: labourer, cleaner) □

f) Retired □

g) Unemployed □

8) State the type of demand or strain in your work or job?

a) Physical demands □

b) Psychological demands □

c) Physical and psychological demands □

d) Nil □

9) Location of residence:

a) Rural □

b) Urban □

10) State how long you are suffering from diabetes mellitus?

a) 2-5 yrs □

b) 6-10 yrs □

c) More than10 yrs □

11) Height =----------cm

12) Weight = ----------kg

13) BMI = ----------

14) PPBS value =----------mg% (Refer from record)

15) State the regularity of taking treatment for diabetes?

a) Very regular □

b) Somewhat regular □

c) Very irregular □

16) How often do you check the blood sugar level?

a) Once in a month □

b) Once in six months □

c) Once in a year □

d) Very rarely □

PART –II ACTIVITY ANALYSIS OF DIABETIC PATIENTS

Instruction: **This section seeks information regarding the duration of your physical activity, speed of your activity and sweating during each activity. Kindly respond to the following by writing the time duration of each activity and placing a tick (✓) mark in the appropriate choice which is applicable to you.**

Type of activity	*Average time spent in a day (mts/hrs)*	*Speed of your activity*			*Sweating during each activity*				
		Fast **(3)**	*Moderate* **(2)**	*Slow* **(1)**	*Always*	*Often*	*Some times*	*Rarely*	*Never*
1. Daily activities									
a. Brushing									
b. Toileting									
c. Bathing									
d. Dressing up									
e. Eating & drinking									
2. Personal activities									
a. Sleeping									
b. Relaxing by sitting									
c. Standing									
d. Sexual activity									
3. Housework									
a. Cooking									
b. Washing clothes									
c. Cleaning beds									
d. Cleaning the house									
e. Caring of animals									
f. Caring of vehicles									

g. Working in farm									
h. Cleaning the yard									
i. Caring the children									
4. Leisure activities									
a. Reading newspaper									
b. Watching TV									
c. Talking to others									
5. Exercise									
a. Walking									
b. Walking upstairs									
c. Walking downstairs									
d. Running									
e. Jogging									
f. Aerobics (eg: yoga)									
g. Swimming									
h. Playing outdoor games (eg: Badminton, football etc.)									
i. Playing indoor games (eg:chess, caroms,etc)									
6. Traveling									
a. Traveling in a bus									
b. Cycling									
c. Driving a car									
d. Biking									
7. Occupation									
a. Sitting & writing									
b. Light work (Eg: teacher, office work, lawyer, doctor etc.)									
c. Moderate work (Eg: carpentry, painting, mason etc.)									
d. Heavy work (Eg: agriculture, quary/ mines, potters etc.)									

APPENDIX –VIII

പ്രമേഹരോഗികളുടെ പ്രവൃത്തി അവലോകന ചോദ്യാവലി

കോഡ് നമ്പർ : . . . .

ഭാഗം-I - സമുദായവിവരം

നിർദ്ദേശം: ഈ ഭാഗത്തിൽ താങ്കളുടെ സമുദായ വിവരത്തെക്കുറിച്ചുള്ള ചോദ്യങ്ങൾ അടങ്ങുന്നു. ദയവായി ഉചിതമായ ഉത്തരത്തിനു നേരെ ശരി (✓) ചിഹ്നം രേഖപ്പെടുത്തുക. ദയവായി എല്ലാ ചോദ്യങ്ങൾക്കും ഉത്തരം എഴുതുക.

1. വയസ്സ് (വർഷത്തിൽ)
   - (a) 41–50 □
   - (b) 51–60 □
   - (c) 61-70 □

2. ലിംഗം
   - (a) ആൺ □
   - (b) പെൺ □

3. മതം
   - (a) ഹിന്ദു □
   - (b) ക്രിസ്ത്യൻ □
   - (c) മുസ്ലിം □
   - (d) മറ്റെന്തെങ്കിലും □

4 വൈവാഹികനില
   - (a) അവിവാഹിതൻ □
   - (b) വിവാഹിതൻ □
   - (c) വിധുരൻ □
   - (d) വിവാഹബന്ധം വേർപ്പെടുത്തിയവൻ □

5 വിദ്യാഭ്യാസം
   - (a) പ്രൈമറി സ്കൂൾ □
   - (b) അപ്പർ പ്രൈമറി സ്കൂൾ □
   - (c) ഹൈസ്കൂൾ □
   - (d) പ്രീ-ഡിഗ്രി □
   - (e) ബിരുദം □
   - (f) ബിരുദാനന്തരബിരുദവും അതിനു മുകളിലും □

6. മാസവരുമാനം
   - (a) ദാരിദ്ര്യ രേഖയ്ക്കു മുകളിൽ □
   - (b) ദാരിദ്ര്യ രേഖയ്ക്കു താഴെ □

7. താങ്കളുടെ തൊഴിൽ പ്രസ്താവിക്കുക

(a) പ്രൊഫഷണൽ ജോലി (ഉദാ: ഡോക്ടർ, വക്കീൽ, അദ്ധ്യാപകൻ)□

(b) വിദഗ്ധ ജോലി (ഉദാ: ആശാരി, കച്ചവടം, നഴ്സ്) □

(c) വിദഗ്ധ ജോലി - താഴ്ന്ന തരം (ഉദാ: ഇലക്ട്രീഷ്യൻ, പ്ലംബർ) □

(d) അർദ്ധവിദഗ്ധ ജോലി (ഉദാ: കൃഷി, കണ്ടക്ടർ) □

(e) അവിദഗ്ധ ജോലി (ഉദാ: കൂലിപ്പണി, ക്ലീനർ, ചുമട്ടുതൊഴിലാളി) □

(f) ജോലിയിൽ നിന്നു വിരമിച്ചവൻ □

(g) തൊഴിൽരഹിതൻ □

8. താങ്കളുടെ ജോലിയിലുള്ള സമ്മർദ്ദത്തിന്റെ തരം പ്രസ്താവിക്കുക

(a) ശാരീരിക സമ്മർദ്ദം □

(b) മാനസിക സമ്മർദ്ദം □

(c) ശാരീരികവും മാനസികവുമായ സമ്മർദ്ദം □

(d) ഇല്ല □

9. വീടു സ്ഥിതി ചെയ്യുന്ന ഇടം

(a) ഗ്രാമം □

(b) പട്ടണം □

10. താങ്കൾ എത്ര നാളായി പ്രമേഹരോഗബാധിതനാണെന്നു പ്രസ്താവിക്കുക

(a) 2-5 വർഷങ്ങൾ □

(b) 6-10 വർഷങ്ങൾ □

(c) 10 വർഷങ്ങൾക്കു മേലെ □

11. ഉയരം = ... സെ.മി

12. ഭാരം = ...കി.ഗ്രാം

13. ബി.എം.ഐ = ...

14. പി.പി.ബി. എസ് അളവ് = ... മി.ഗ്രാം% (റിക്കോർഡ് പരിശോധിക്കുക)

15. പ്രമേഹത്തിനുള്ള ചികിത്സയെടുക്കുന്ന പതിവ് പ്രസ്താവിക്കുക

(a) വളരെ കൃത്യമായി □

(b) ഭാഗികമായി കൃത്യമായി □

(c) വളരെ അപൂർവ്വമായി □

16. താങ്കൾ എപ്പോഴൊക്കെയാണ് രക്തത്തിലെ പഞ്ചസാരയുടെ അളവു പരിശോധിക്കുന്നത്?

(a) മാസത്തിലൊരിക്കൽ □

(b) 6 മാസത്തിലൊരിക്കൽ □

(c) വർഷത്തിലൊരിക്കൽ □

(d) വളരെ വിരളമായി □

ഭാഗം II - പ്രമേഹരോഗിയുടെ പ്രവൃത്തി അവലോകനം.

നിർദ്ദേശം : ഈ ഭാഗം താങ്കളുടെ പ്രവൃത്തിയുടെ ദൈർഘ്യം, പ്രവൃത്തിയുടെ വേഗത, ഓരോ പ്രവൃത്തിയുടെ ഇടയ്ക്കുള്ള വിയർപ്പ് എന്നിവയെക്കുറിച്ചുള്ള വിവരങ്ങൾ അന്വേഷിക്കുന്നു. ഓരോ പ്രവൃത്തിയുടെ സമയ ദൈർഘ്യം എഴുതിയും താങ്കൾക്ക് അനുയോജ്യവും പ്രയോഗക്ഷമവുമായ ഇനത്തിന് നേരെ ശരി (✓)ചിഹ്നം അടയാളപ്പെടുത്തിയും താഴെ കൊടുത്തിരിക്കുന്നവയോട് ദയവായി പ്രതികരിക്കുക.

പ്രവൃത്തിയുടെ തരം	ഒരു ദിവസത്തിൽ ചെലവഴിച്ച ശരാശരി സമയം (മിനിട്ട് / മണിക്കൂർ)	താങ്കളുടെ പ്രവൃത്തിയുടെ വേഗത			ഓരോ പ്രവൃത്തിയുടെയിടയ്ക്കുള്ള വിയർപ്പ്				
		വേഗത്തിൽ (3)	മിതമായത് (2)	പതുക്കെ (1)	എപ്പോഴും	മിക്കപ്പോഴും	വല്ലപ്പോഴും	വിരളമായി	ഇല്ല
1. ദിനചര്യകൾ									
a. പല്ലുതേയ്ക്കൽ									
b. മലവിസർജനം									
c. കുളി (സ്നാനം)									
d വസ്ത്രധാരണം									
e. ഭക്ഷിക്കുമ്പോഴും പാനം ചെയ്യുമ്പോഴും									
2. സ്വകാര്യ പ്രവൃത്തികൾ									
a. ഉറക്കം									
b. ഇരുന്നുള്ള വിശ്രമം									
c. നിൽപ്പ്									
d. ലൈംഗിക പ്രവൃത്തി									

പ്രവൃത്തിയുടെ തരം	ഒരു ദിവസത്തിൽ ചെലവഴിച്ച ശരാശരി സമയം (മിനിട്ട് / മണിക്കൂർ)	താങ്കളുടെ പ്രവൃത്തിയുടെ വേഗത			ഓരോ പ്രവൃത്തിയുടെയിടയ്ക്കുള്ള വിയർപ്പ്				
		വേഗത്തിൽ (3)	മിതമായത് (2)	പതുക്കെ (1)	എപ്പോഴും	മിക്കപ്പോഴും	വല്ലപ്പോഴും	വിരളമായി	ഇല്ല
3. വീട്ടുജോലി									
a. പാചകം									
b. വസ്ത്രം കഴുകൽ									
c. കിടക്ക വൃത്തിയാക്കൽ									
d. വീട് വൃത്തിയാക്കൽ									
e. മൃഗസംരക്ഷണം									
f. വാഹന പരിപാലനം									
g. കൃഷിയിടത്തിലെ വേല									
h. മുറ്റം വൃത്തിയാക്കൽ									
i. ശിശുസംരക്ഷണം									
4. വിശ്രമ പ്രവൃത്തികൾ									
a. പത്ര വായന									
b. ടി.വി. വീക്ഷണം									
c. മറ്റുള്ളവരുമായുള്ള സംഭാഷണം									
5. വ്യായാമം									
a. നടത്തം									
b. കോണി കയറൽ									
c. കോണി ഇറങ്ങൽ									
d. ഓട്ടം									
e. ജോഗിങ്ങ്									

പ്രവൃത്തിയുടെ തരം	ഒരു ദിവസത്തിൽ ചെലവഴിച്ച ശരാശരി സമയം (മിനിട്ട് / മണിക്കൂർ)	താങ്കളുടെ പ്രവൃത്തിയുടെ വേഗത			ഓരോ പ്രവൃത്തിയുടെയിടയ്ക്കുള്ള വിയർപ്പ്				
		വേഗത്തിൽ (3)	മിതമായത് (2)	പതുക്കെ (1)	എപ്പോഴും	മിക്കപ്പോഴും	വല്ലപ്പോഴും	വിരളമായി	ഇല്ല
h. വീടിനു പുറത്തുള്ള കളികൾ (ഉദാ: ബാഡ്മിന്റൺ, ഫുട്ബോൾ മുതലായവ)									
i. വീടിന് അകത്തുള്ള കളികൾ (ഉദാ: ചെസ്, കാരംസ് മുതലായവ)									
6. യാത്ര									
a. ബസ്യാത്ര									
b. സൈക്കിൾ സവാരി									
c. കാർ ഓടിക്കൽ									
d. ബൈക്ക് ഓടിക്കൽ									
7. തൊഴിൽ									
a. ഇരുന്ന് എഴുത്ത്									
b. ഇളംവേല (ഉദാ: അദ്ധ്യാപകൻ, ഓഫീസ് വേല,വക്കീൽ, ഡോക്ടർ മുതലായവ)									
c. മിതമായവേല (ഉദാ: ആശാരിപ്പണി, പെയിന്റിംഗ്, മേസ്തിരി മുതലായവ)									
d. കഠിനവേല (ഉദാ: കൃഷിപ്പണി, കാറി/ ഖനികൾ, ചുമട്ടുതൊഴിലാളികൾ മുതലായവ)									

APPENDIX-IX

Mean, S.D And 't' Value Between Physical Activities And Type 2 Diabetic Patients With Controlled And Uncontrolled Blood Sugar

No.	Physical activities	Type 2 diabetes				't' value	'p' value
		Controlled blood sugar (n=50)		Uncontrolled blood sugar (n=50)			
		Mean time (mts)	S.D	Mean Time (mts)	S.D		
1.	**Daily activities**						
a.	Brushing	7.5	3	6	2.2	2.8	**0.006(S)**
b.	Toileting	10	3.2	10	4.3	0.1	0.9(NS)
c.	Bathing	13.5	7.2	13.2	5.5	0.2	0.8(NS)
d.	Dressing up	7.9	4.7	8.4	5	-0.5	0.6(NS)
e.	Eating & drinking	23	6.9	22.5	7.9	0.4	0.7(NS)
2.	**Personal activities**						
a.	Sleeping	408	44.5	410	88.7	-0.2	0.9(NS)
b.	Relaxing by sitting	97.6	67.2	86.6	89	0.7	0.5(NS)
c.	Standing	58.8	66.5	41.0	52.6	1.5	0.1(NS)
d.	Sexual activity	10.2	16.6	6.4	4.6	1.5	0.1(NS)
3.	**Housework**						
a.	Cooking	132.6	119.9	89.4	109.2	1.9	0.06(NS)
b.	Washing clothes	31.3	29.2	21.6	28.4	1.7	0.09(NS)
c.	Cleaning beds	7.2	6.4	6.8	9	0.3	0.8(NS)
d.	Cleaning the house	15.4	19.6	12.4	17.4	0.8	0.4(NS)
e.	Caring of animals	35.2	51.6	17	35.3	2.1	**0.04(S)**
f.	Caring of vehicles	7.1	13.5	5.2	17.9	0.6	0.5(NS)
g.	Working in farm	38.7	66.5	28.5	36.6	0.9	0.3(NS)
h.	Cleaning the yard	16.4	13.8	11.4	15.2	1.7	0.08(NS)
i.	Caring the children	9.8	22.9	10.5	30.6	-0.1	0.9(NS)
4.	**Leisure activities**						
a.	Reading newspaper	20.3	26	14.7	12.9	1.4	0.2(NS)
b.	Watching TV	152.3	86.4	142.3	70.9	0.6	0.5(NS)
c.	Talking to others	63.1	61.2	48.5	483	1.3	0.2(NS)
5.	**Exercise**						
a.	Walking	29.9	31.7	16.1	22.8	2.5	**0.01(S)**
b.	Walking upstairs	4.9	7	2	4.6	2.5	**0.01(S)**
c.	Walking downstairs	4	5.9	1.7	4.2	2.3	**0.02(S)**
d.	Running	0.9	4.7	0.2	1.4	1	0.3(NS)
6.	**Traveling**						
a.	Traveling in a bus	12.6	32.1	30	10.9	2	0.05(NS)

No.	Physical activities	Type 2 diabetes				't' value	'p' value
		Controlled blood sugar (n=50)		Uncontrolled blood sugar (n=50)			
		Mean time (mts)	S.D	Mean Time (mts)	S.D		
b.	Cycling	1.8	6.6	0.9	4.7	0.8	0.4(NS)
c.	Driving a car	2	9.5	1.8	9.4	0.1	0.9(NS)
d.	Biking	6.1	15.1	4	9.3	0.8	0.4(NS)
7.	**Occupation**						
a.	Sitting & writing	13	60.6	21.5	94.9	-0.5	0.6(NS)
b.	Light work	63.6	134.1	10.8	56.5	2.6	**0.01(S)**
c.	Moderate work	12	60.6	13.2	65.6	-0.09	0.9(NS)
d.	Heavy work	70.8	132.6	112.8	146.8	-1.5	0.1(NS)

Abstract

ABSTRACT

A study to analyze the physical activities of type 2 diabetic patients with controlled and uncontrolled blood sugar in a selected hospital at Kollam district, Kerala was conducted by 30083604 as a partial fulfillment of the requirement of the Degree of Master Science in Nursing from Annai J.K.K Sampoorani Ammal College of Nursing, Komarapalayam under the Tamil Nadu Dr. M.G.R Medical University, Chennai, March 2009-2010.

The objectives of the study were (1). To compare the physical activities among type 2 diabetic patients with controlled and uncontrolled blood sugar. (2)To find the correlation between the physical activities and the post prandial blood sugar, body mass index among type 2 diabetic patients with controlled and uncontrolled blood sugar.(3)To determine the significant association between the physical activities, postprandial blood sugar and selected factors among the type 2 diabetic patients with controlled and uncontrolled blood sugar.

The hypotheses of the study were (1) There will be a significant difference in the physical activities between type 2 diabetic patients with controlled and uncontrolled blood sugar. (2)There will be a significant difference in the speed in physical activities between type 2 diabetic patients with controlled and uncontrolled blood sugar. (3) There will be a significant difference in the sweating during physical activities between type 2 diabetic patients with controlled and uncontrolled blood sugar. (4) There will be a significant correlation between the physical activities and the post prandial blood sugar among type 2 diabetic patients with controlled and uncontrolled blood sugar. (5) There will be a significant correlation between the physical activities and body mass index among type 2 diabetic patients with controlled and uncontrolled blood sugar. (6) There will be a significant association between the physical activities and selected factors among type 2 diabetic patients with controlled and uncontrolled blood sugar. (7) There will be a significant association between selected factors and post prandial blood sugar among type 2 diabetic patients with controlled and uncontrolled blood sugar.

The investigator organized the review of literature under 2 sections as follows. (1) Studies related to physical activities among type 2 diabetic patients. (2) Studies related to the physical activities in the control of blood sugar among type 2 diabetic patients.

The conceptual framework for the study was designed by the investigator on the basis of Structure Process Outcome Model. The research design used was a descriptive design, comparative in nature to analyze the physical activities of type 2 diabetic patients.

The samples for the study were selected from the OPD of Vijaya Hospital, Kottarakkara. The sample size was 100 type 2 diabetic patients; 50 with controlled blood sugar and 50 with uncontrolled blood sugar. The samples were selected by purposive sampling. The data were collected by self-reporting semi structured questionnaire, developed by the investigator. The tool was validated by 4 experts. The main study was conducted in Vijaya Hospital, Kottarakkara in Kerala. The data collected were tabulated, analyzed and interpreted by SPSS package (version 10.0).

The findings of the study revealed that (1) Type 2 diabetic patients with controlled blood sugar spent more time in housework, exercise and traveling. (2) There was significant association between the speed in housework, exercise and the control of blood sugar among type 2 diabetic patients. (3) There was an association between sweating in personal activity and control of blood sugar among type 2 diabetic patients. (4)There was significant negative correlation between the time spent in exercise and controlled blood sugar among type 2 diabetic patients.

The study clearly concluded by stating the implications, limitations and recommendations.