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# COMPARISON OF COMPLICATIONS AMONG DIABETIC PATIENTS USING INSULIN AND ORAL HYPOGLYCEMICS ADMITTED IN WARDS OF ALLIED HOSPITAL. FAISALABAD

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**Abstract:**

***Objectives:*** *To assess the development of complications in diabetic patients hypoglycemics and injectable insulin. Diabetes mellitus is a disorder m which blood sugar levels are abnormally high because the body does not produce enough insulin to meet Its need. Urination and thirst are increased and people lose weight when they are not trying to. It damages nerves and blood vessels and may lead to heart attack, stroke, retinopathy, kidney failure and diabetic foot. Doctors diagnose diabetes by measuring blood sugar level. People with diabetes need to follow a diet that is low in enrhohydriiies.rut.exerei.se and drugs to lower blood sugar level, oral hypoglycemics and injectable insulin can be used to control diabetes and prevent the development of diabetic complications. Our objective was to compare the development of complications in diabetic patients using oral hypoglycemics and those using injectable insulin. It was a cross-sectional type of study carried out in the medical and surgical wards of Allied Hospital Faisalabad from June 2014 to August 2014. Sampling population was all the patients admitted in surgical and medical wards. A sample of 55 patients, 30 from medical and 25 from surgical wards was taken using non-probability sampling. Out of 55 patients 34 [61.81%] were taking oral hypoglycemics and [100%] were complicated whereas 15 [27.27%] were taking injectable insulin out of which 14 [03.34%] were complicated 0 [10.90%] were taking both out of which 5 [83.34%] were complicated. There was no significant difference in the development of complications between the patients using oral hypoglycemics and injectable insulin because the study was carried out in tertiary care hospital where most of the patients come with complications.*

**Keywords:** *Diabetes Mellitus, Injectable Insulin, Oral Hypoglycemics, Diabetic Complications.*

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## INTRODUCTION:

The term diabetes mellitus describes a metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disturbances of carbohydrates. fats and protein metabolism resulting from defects in insulin secretion, insulin action or both. The effects of diabetes mellitus include long-term damage, dysfunction and failure of various organs. There are two main types of diabetes [1]. Type I diabetes usually develops in childhood and adolescence and patients require lifelong insulin injections for survival. Type 2 usually develops in adulthood and is related to obesity, lack of physical activity and unhealthy diet. This is more common type of diabetes representing 90% of cases worldwide and treatment may involve lifestyle changes and, oral medications or even insulin injections. 347 million people worldwide have diabetes1.In 2004 [2]. an estimated 3.4 million people died from consequences of high fasting blood sugar More than 80% of diabetes death occur in low and middle-income countries. World Health Organization[WHO] projects that diabetes will be the 7lh leading cause of death in 20302 Type 2 diabetes comprises 90% of people with diabetes around the world and is largely the result of excess body weight and physical inactivity. Data from WHO statement is that total prevalence is 12.9 million in Pakistan that makes 10% of total population of which 9.4 million are diagnosed and 3.5 million are undiagnosed. 38 million people. 20.5 % women and 15.9% men have prediabetes. It is estimated that Pakistan has become 7lh largest country in terms of diabetes population and it will be 4lh largest by the year 2030.lt is an alarming figure. The prevalence of diabetes in the urban versus the rural areas was 6.0% in men and 3.5% in women against 6.9% in men und 2.5% in women, respectively [3]. Overall glucose intolerance was 22.04% in urban and 17.15% in rural area. The major risk factors identified were age. positive family history and obesity especially central obesity. Patients with type 2 diabetes previous prospective studies have shown an association between degree of hyperglycemia and increased risk of microvascular complicate sensory neuropathy, myocardial infarction, stroke, macrovascular mortality, and all causes of mortality. Generally, these studies measured glycaemia as being high or low or assessed glycaemia on a single occasion, whereas repeated measurements of glycaemia over several years would be more informative [4]. The importance of protecting the body from hyperglycemia cannot be overstated; the direct and indirect effects on human vascular tree are the major source of morbidity and mortality in both type I and type II diabetes. Generally, the injurious effects of hyperglycemia are separated into macrovascular complications [coronary artery disease, peripheral arterial disease, and stroke] and microvascular complications [diabetic nephropathy, neuropathy, and retinopathy. Chronic and progressive nature of the disorder, which is associated with obesity, hypertension, advancing age and inadequate screening, leads to deposition of harmful substances in the vascular endothelium ultimately causing development of microangiopathies or microvascular complications. These complications include retinopathy, nephropathy and peripheral neuropathy, which produce early death and increased morbidity and health care costs. These complications vary in prevalence in different populations depending on various factors such as genetic predisposition ethnicity, type of diabetes and associated predisposing factors [6]. It has been concluded <hat diabetic ketoacidosis is common in patients with diabetes mellitus occurring in 14.3% of all cases. The primary techniques available to assess the quality of a patient's glycemic control are self-monitoring of blood glucose [SMBG] and interval measurement of hemoglobin A|C [MbA|C]. Adults with type 2 diabetes arc typically treated with metformin, an oral medication that helps reduce elevated blood sugar. When combined with exercise and diet modification, metformin alone can help many patients control their blood sugar levels, keeping the disease in check [7]. However, some patients require a second drug usually an oral medication such as sulfonylurea or a sell administered injection of insulin to bring their disease under control. Insulin therapy may be considered early or late in the disease course. Basal insulin can be added to oral hypoglycemic agents initially and later prandial insulin can be added in a stepwise fashion. Research studies have shown that control of blood glucose, blood pressure and blood lipids help to prevent complications in people with type 1 or type 2 diabetes [8].

## LITERATURE REVIEW

The American Diabetic Association [ADA] recommends initiation of complications monitoring at time of diagnosis of diabetes mellitus. This regimen should include yearly dilated eye examination, annual microalbumin checks and foot examination at each visit. Prognosis in patients with diabetes mellitus is strongly influenced by degree of control. Chronic hyperglycemia is associated with increased risk of micro vascular complications as shown in Diabetes Control and Complications Trial [DCCT] and United Kingdom Prospective Diabetes Study [UKPDS].8, 9 In people with type-II diabetes studies suggest that tight glycemic control [HbAlc<7% or lower] is valuable for microvascular and macrovascular disease risk reduction in patients with recent onset

and a longer life expectancy. Early initiation of pharmacological therapy is associated with improved glycemic control and reduced long term complications. 10 The Kumamoto study was the first prospective randomized controlled trial showing that multiple insulin injection therapy in type-II diabetes, compared with conventional insulin treatment, was associated with reduction in onset and progression of retinopathy, nephropathy and neuropathy in a small number of Japanese patients with type-II diabetes [9, 10]. Aerobic exercise improves insulin sensitivity and glycemia markedly in some patients. However physical activity helps lower HbAlc only when combined with dietary complications. In a study it was found that long term endurance and strength training resulted in improved metabolic control of diabetes and significant cardiovascular risk reduction compared with standard treatment. It was postulated that early insulin replacement in type-II diabetes and even in prediabetics, may reduce cardiovascular risk and may even offer protection from beta cells of pancreas. However, the Outcome Reduction with Initial Glargine Intervention ORIGIN is still going on.12 DCCT [Diabetes Control and Complications Trial] was a major clinical study conducted front 1983 to 1993 and showed that keeping the blood glucose levels as close to normal as possible slows the onset and progression of eye. kidney and nerve damage caused by diabetes mellitus. The follow up study called Epidemiology of Diabetes Intervention and Complications [EDIC], is assessing the incidence and predictors of cardiovascular disease events such as heart attack, stroke as well as diabetic complications related to eye. kidney and nerves. One study of people with type 2 diabetes mellitus. the United Kingdom Prospective Diabetes Study [UKPDS]. demonstrated that controlling blood glucose levels reduced the risks of diabetic eye disease and kidney disease, the Action to Control Cardiovascular Risk in Diabetes[ACCORD] trial,13 a multicenter randomized trial is studying approaches to prevent major cardiovascular events in individuals with type 2 diabetes mellitus. A cross sectional population study was performed in a cohort of 890 non-insulin dependent diabetes mellitus [N1DDM] patients residing in the greater Denver metropolitan region[11].

Its purpose was to evaluate the relationship between insulin and oral hypoglycemic agents with regard to metabolic control and diabetic complications. In a study it was concluded that severe long-term abnormalities can result such as eye complications, heart disease, kidney and loot problems it blood sugar levels are poorly controlled.14, 15 These complications are of two types, microvascular complications that include retinopathy, nephropathy, neuropathy and peripheral vascular disorders and macrovascular complications that include cardiovascular and cerebrovascular diseases [12].

A study on diabetes mellitus concluded that the complications of diabetes can involve multiple systems throughout the body that are susceptible to the detrimental effects of oxidative stress and apoptotic cell injury.16 A study on diabetes related cardiovascular diseases demonstrated that innovative strategies are necessary for the implementation of new treatments of diabetes that are generated by further understanding of the cellular pathways that govern the pathological consequences of diabetes Furthermore, a significant portion of the population has undiagnosed diabetes, illustrating the need for improved early diagnosis. A study on disordered eating behavior in young women with type 2 diabetes depicted that diabetes also leads to long-term complications throughout the body involving cardiovascular, renal and nervous disorders. A study on macular ischemia as a marker of diabetic retinopathy and nephropathy stated that the chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction and failure of various organs especially the eyes, kidneys, nerves, heart and blood vessels.19 A study on microvascular and macrovascular complications of diabetes stated that the importance of protecting the body from hyperglycemia cannot be overstated. 20 The direct and indirect effects on the human vascular tree are the major source of morbidity and mortality in both type 1 and type 2 diabetes. Generally, the injurious effects of hyperglycemia are separated into macrovascular and microvascular complications having 2 to 3 of the above-mentioned complications. When compared those taking OHA with those taking insulin, 100% patients taking OHA are compared to 93.34% complicated patients taking insulin. 26.47% patients using OHA and 46.67% patients using insulin had diabetic ketoacidosis. 26.47% patients using OHA whereas 40% patients using insulin had diabetic nephropathy. 79.41% patients using OHA while 73.34% patients using insulin had diabetic neuropathy. 58.82% patients using OHA and 53.34% patients using insulin had diabetic retinopathy. 11.76% patients using OHA while 46 67% patients using insulin had diabetic foot. Diabetic neuropathy and diabetic retinopathy are more in patients using OHA while diabetic ketoacidosis, diabetic nephropathy and diabetic foot are more in patients using insulin. The non-complicated patients and the patients having only one of the above-mentioned complications took regular medication, had controlled diet, kept their blood glucose level in check by monitoring it on regular basis and did

regular exercise showing the effects of these habits in better control and prevention of the development of complications in these patients[13].

## MATERIALS AND METHODS:

STUDY DESIGN:
Cross sectional survey.
POPULATION:
All diabetic patients admitted in medical and surgical wards of Allied Hospital,
Faisalabad.
SAMPLING UNIT:
Each admitted diabetic patient in medical and surgical wards of Allied Hospital, Faisalabad.
DURATION OF STUDY:
June 2014 - August 2014 [Gantt's chart see Annexure 2]
SAMPLE SIZE:
Sample size 55
30 from medical and 25 from surgical ward
SAMPLING TECHNIQUE:
Non-probability due to convenient sampling was done, due to time constraints.
DATA COLLECTION PROCEDURE:
Questionnaires comprising of open ended and closed ended questions was used to collect information. Face-to-face interview was done.
DATA ANALYSIS: The data was cleaned and quality of data was checked. It was entered into Statistical Package for Social Sciences [SPSS] and means were calculated by descriptive statistics like mean, median and mode.

## RESULTS:

Table No 1: Gender

| Sex | No of Persons | Percentage |
|---|---|---|
| Male | 28 | 50.9 |
| Female | 29 | 49.09 |
| Total | 55 | 100 |

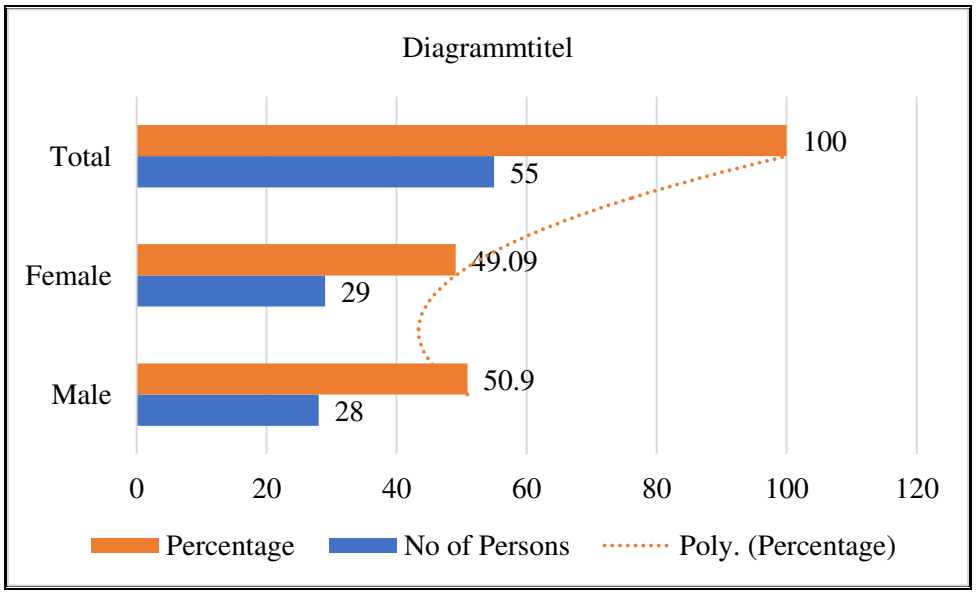


Table No 2: Age

| Age | Number of Persons | Percentage |
|---|---|---|
| 20 - 40 | 9 | 16.36 |
| 41 - 60 | 28 | 50.9 |
| 61 - 80 | 17 | 30.9 |
| Above 80 | 1 | 1.8 |
| Total | 55 | 100 |

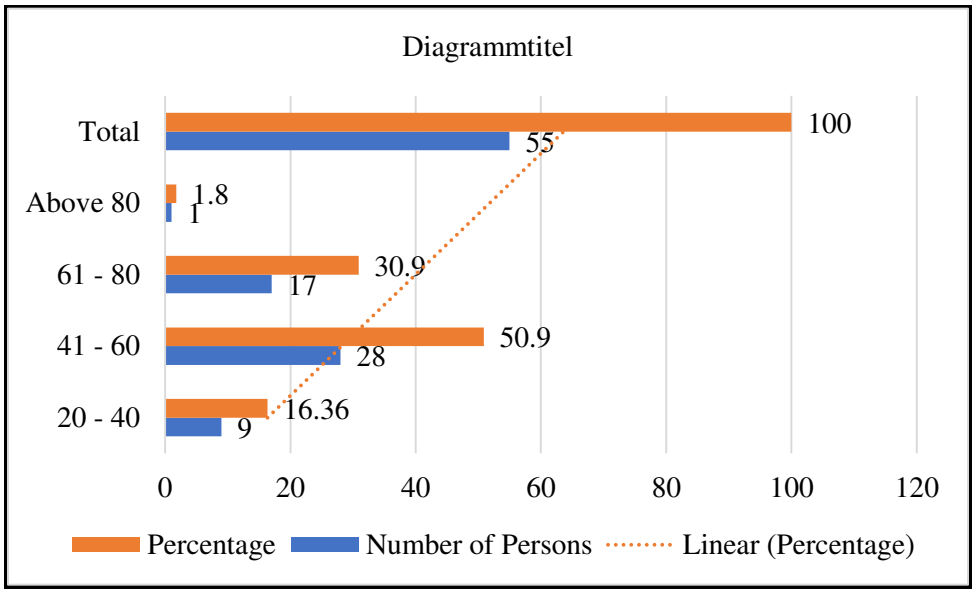



Table No 3: Occupation

| Occupation | Number of Persons | Percentage |
|---|---|---|
| Office Work | 6 | 10.9 |
| Labour Work | 15 | 27.27 |
| House Wife | 23 | 41.81 |
| Retired | 11 | 20 |
| Total | 55 | 100 |

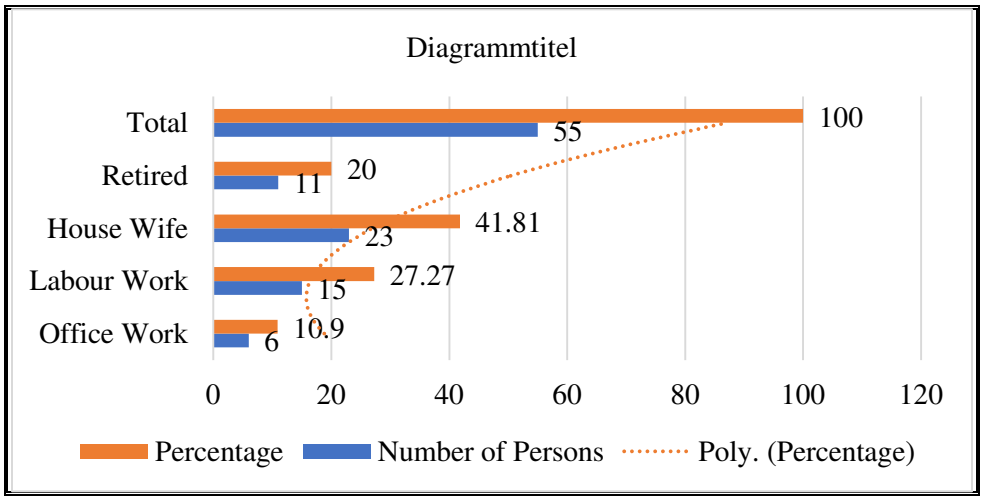


Table No 4: Residence of Patients

| Residence | Number of Persons | Percentage |
|---|---|---|
| Rural | 43 | 78.18 |
| Urban | 12 | 21.81 |
| Total | 55 | 100 |

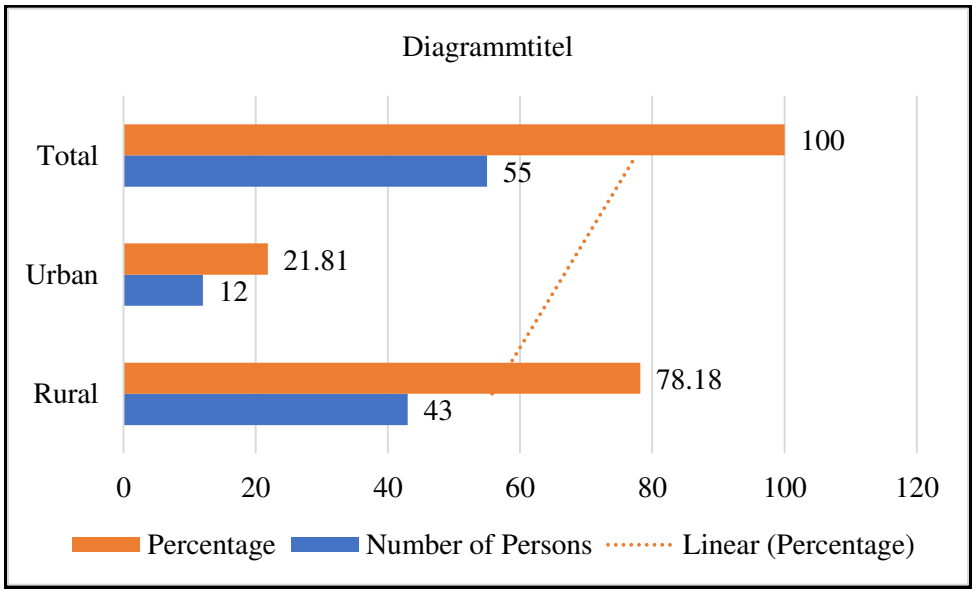



Table No 5: Monthly Income

| Monthly Income | Number of Persons | Percentage |
|---|---|---|
| < 10,000 | 19 | 34.54 |
| 10,000 - 20,000 | 21 | 38.18 |
| 20,000 - 30,000 | 13 | 23.63 |
| > 30,000 | 2 | 3.63 |
| Total | 55 | 100 |

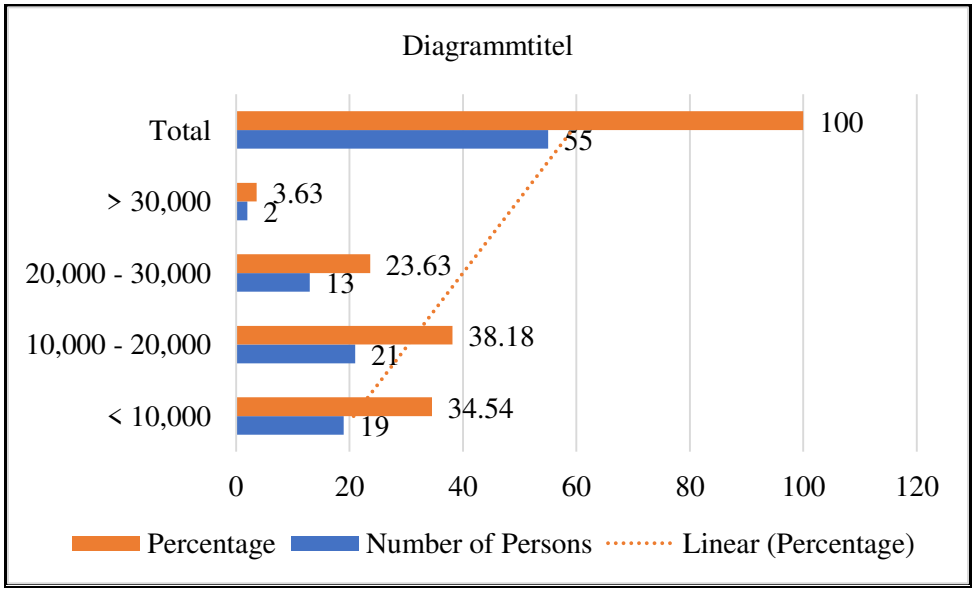


Table No 6: Year since diagnosis

| Year Since Diagnosis | Number of Persons | Percentage |
|---|---|---|
| 0 - 5 Years | 29 | 52.72 |
| 5 - 10 Years | 13 | 23.63 |
| 10 - 15 Years | 11 | 20 |
| > 15 Years | 2 | 3.63 |
| Total | 55 | 100 |

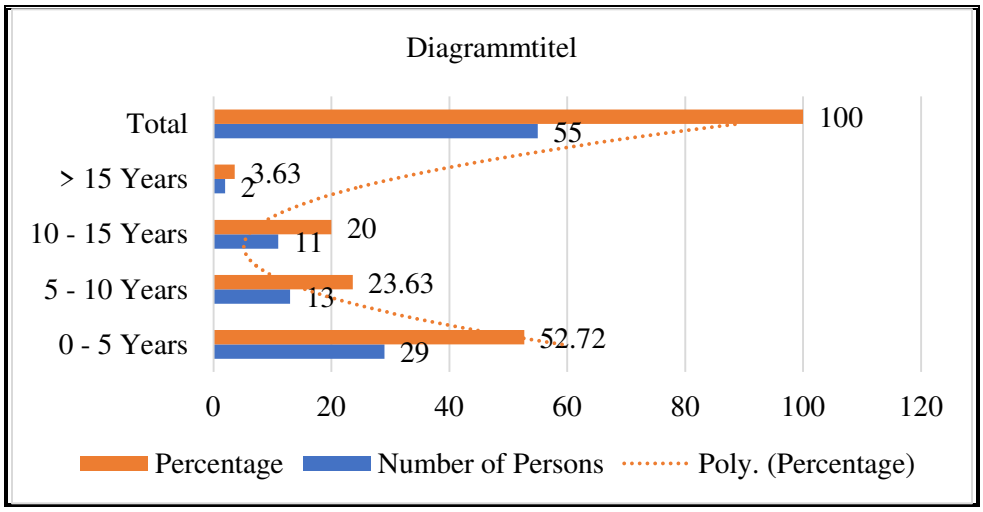



Table No 7: How Diagnosed

| Diagnosis | No of Persons | Percentage |
|---|---|---|
| Accidently | 7 | 12.72 |
| Intentional Test | 19 | 34.54 |
| Doctor Prescription | 29 | 52.22 |
| Total | 55 | 100 |

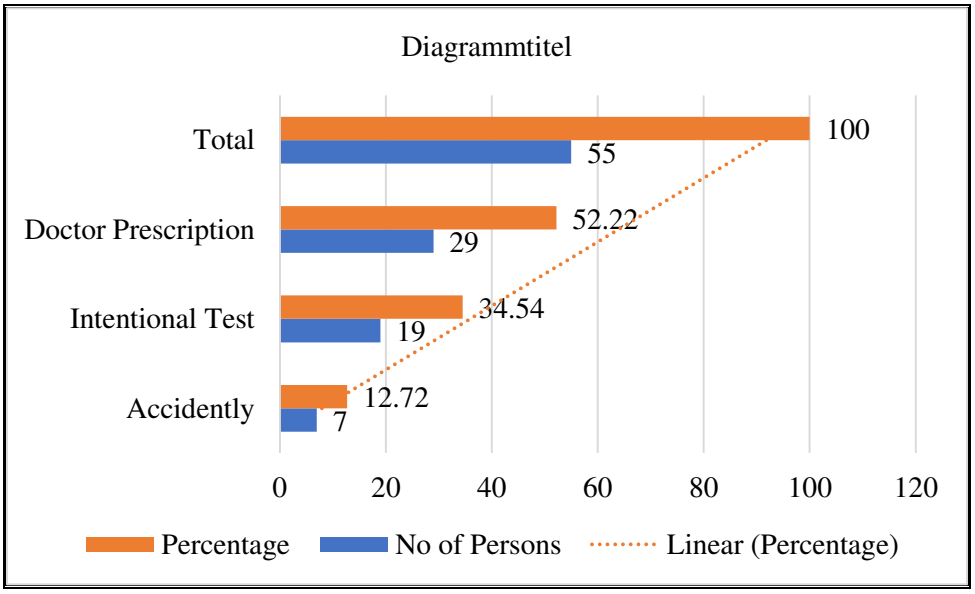


Table No 8: Type of Treatment

| Treatment Type | No of Persons | Percentage |
|---|---|---|
| Allopathic | 55 | 100 |
| Homeopathic | 0 | 0 |
| Hikmah | 0 | 0 |
| Total | 55 | 100 |

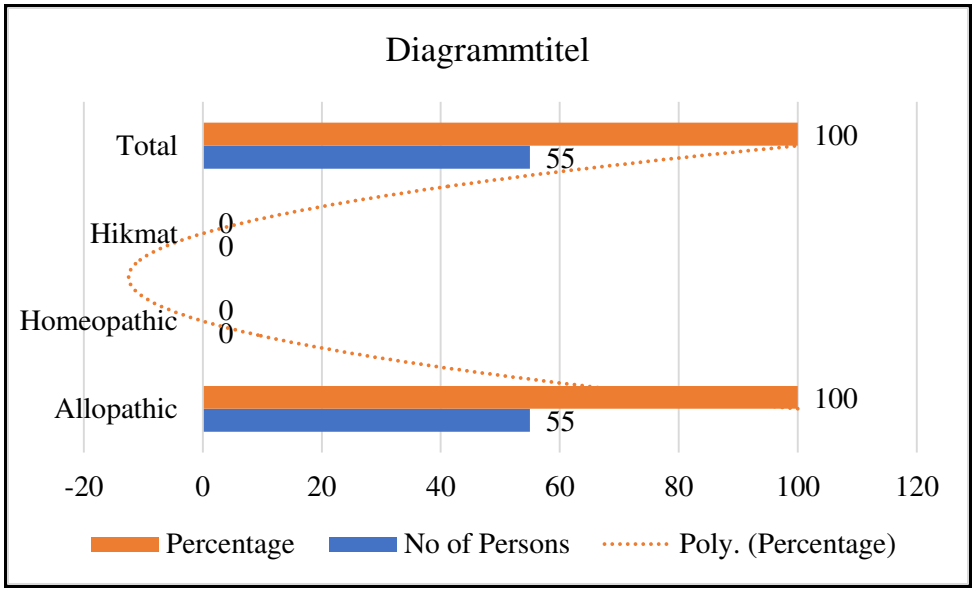



Table No 9: Kind of Medicine

| Medicine Type | No of Persons | Percentage |
|---|---|---|
| Oral Hypoglycemics | 34 | 61.81 |
| Insulin | 15 | 27.27 |
| Both | 6 | 10.9 |
| Total | 55 | 100 |

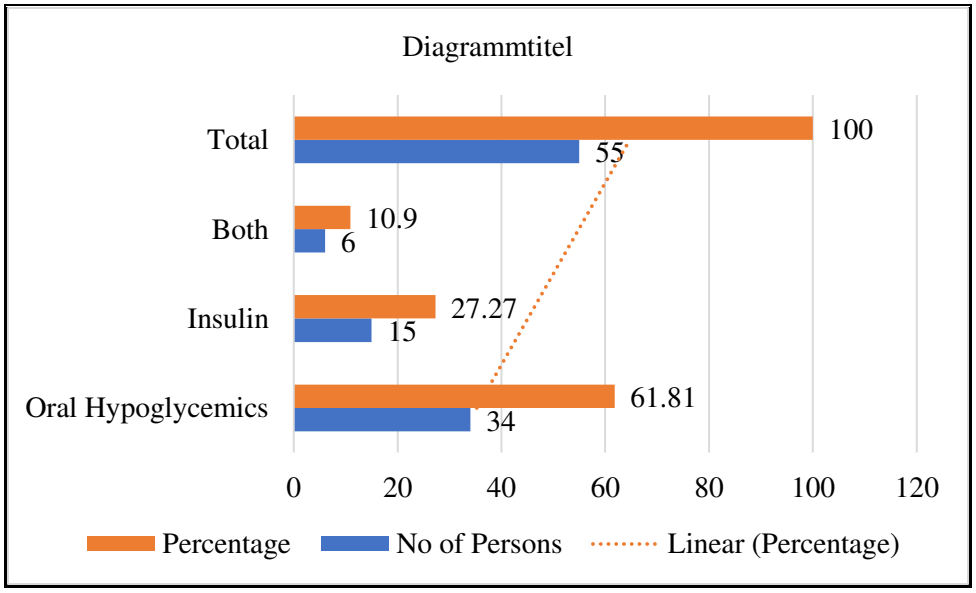


Table No 10: Compliance of Patient

| Compliance | No of Persons | Percentage |
|---|---|---|
| Regular | 43 | 78.18 |
| Irregular | 12 | 21.81 |
| Total | 55 | 100 |

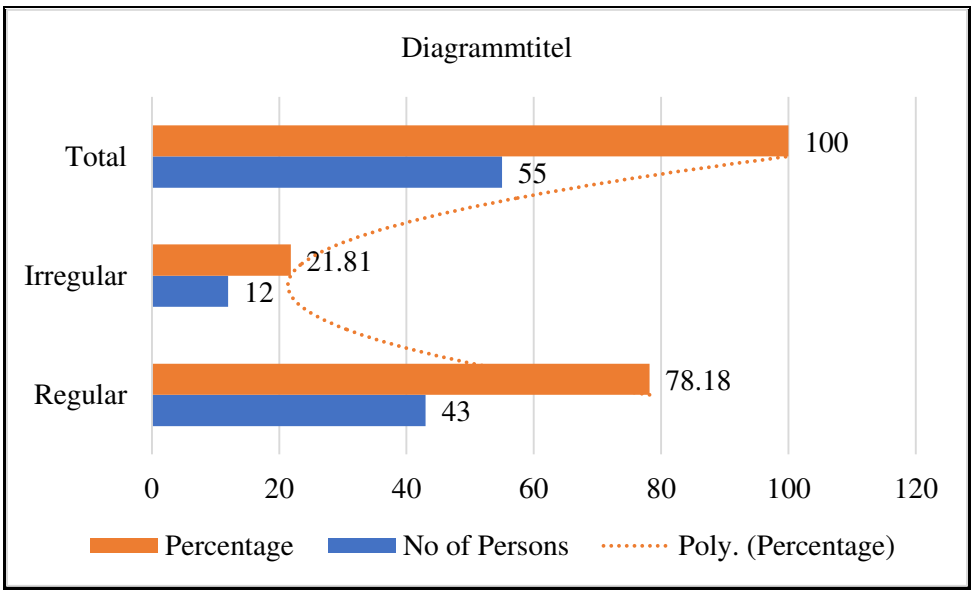



Table No 11: Treatment Duration

| Treatment Duration | No of Persons | Percentage |
|---|---|---|
| < 5 Years | 33 | 60 |
| 5 - 10 Years | 14 | 25.45 |
| 10 - 15 Years | 7 | 12.72 |
| > 15 Years | 1 | 1.81 |
| Total | 55 | 100 |

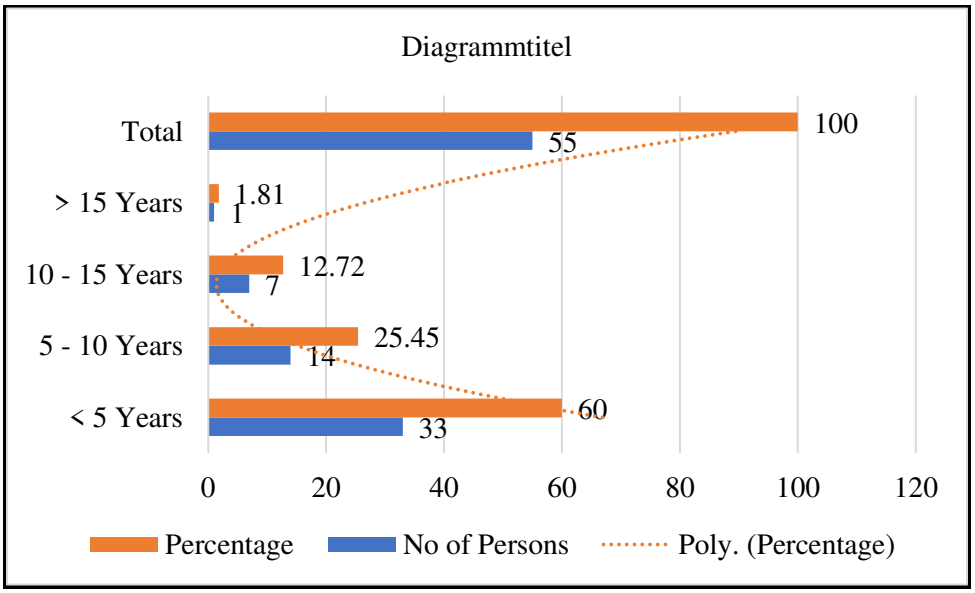


Table No 12: Diet Control

| Diet | No of Persons | Percentage |
|---|---|---|
| Controlled | 44 | 80 |
| Uncontrolled | 11 | 20 |
| Total | 55 | 100 |

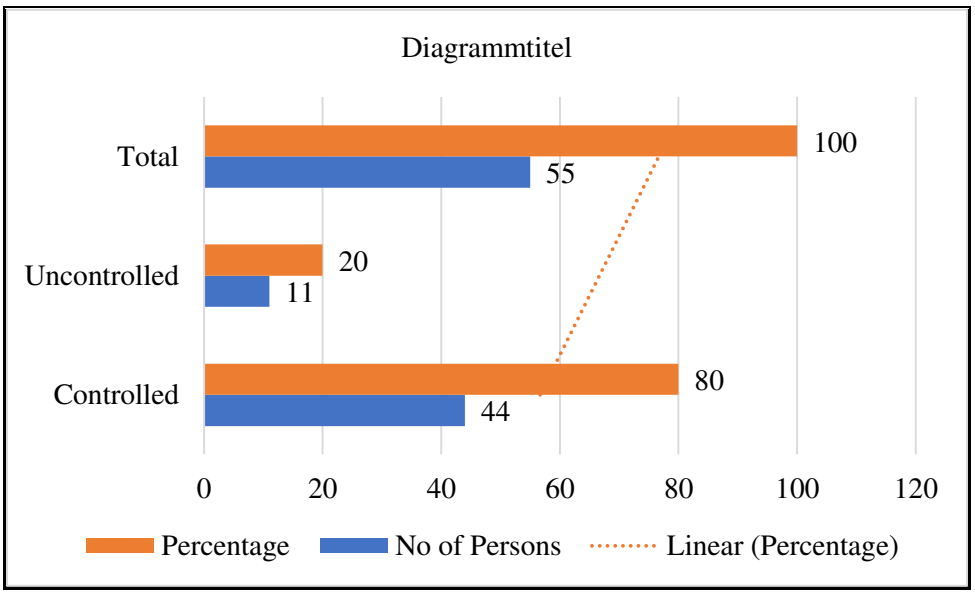



Table No 13: Tests to Check Blood Sugar Level

| Tests | No of Persons | Percentage |
|---|---|---|
| HbA1c | 0 | 0 |
| FBS | 22 | 40 |
| RBS | 16 | 29.09 |
| None | 2 | 3.63 |
| Both | 15 | 27.27 |
| Total | 55 | 100 |

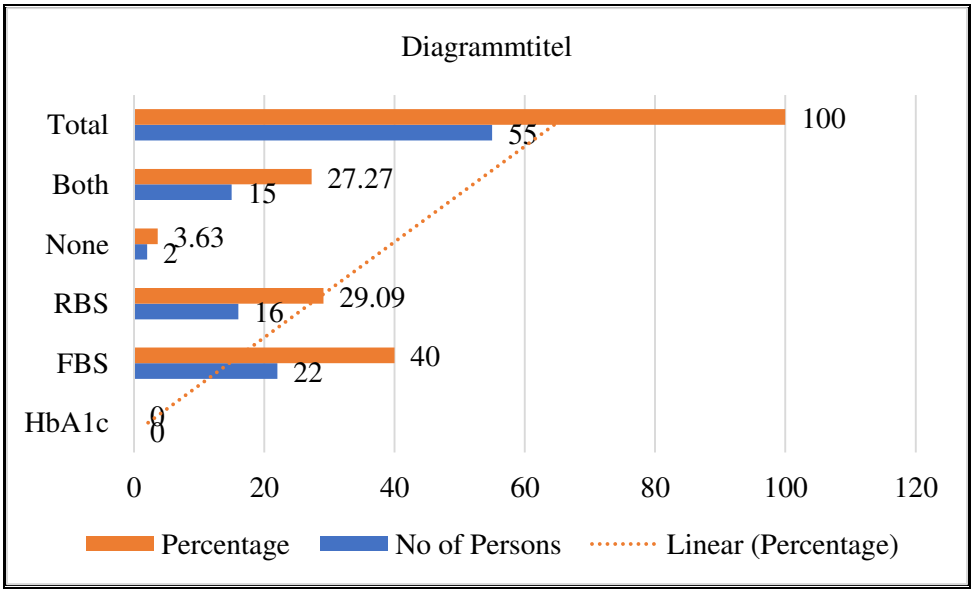


Table No 14: Place of carrying out tests

| Place of Test | No of Persons | Percentage |
|---|---|---|
| At Home | 23 | 41.81 |
| At Lab | 31 | 56.36 |
| None | 1 | 1.82 |
| Total | 55 | 100 |

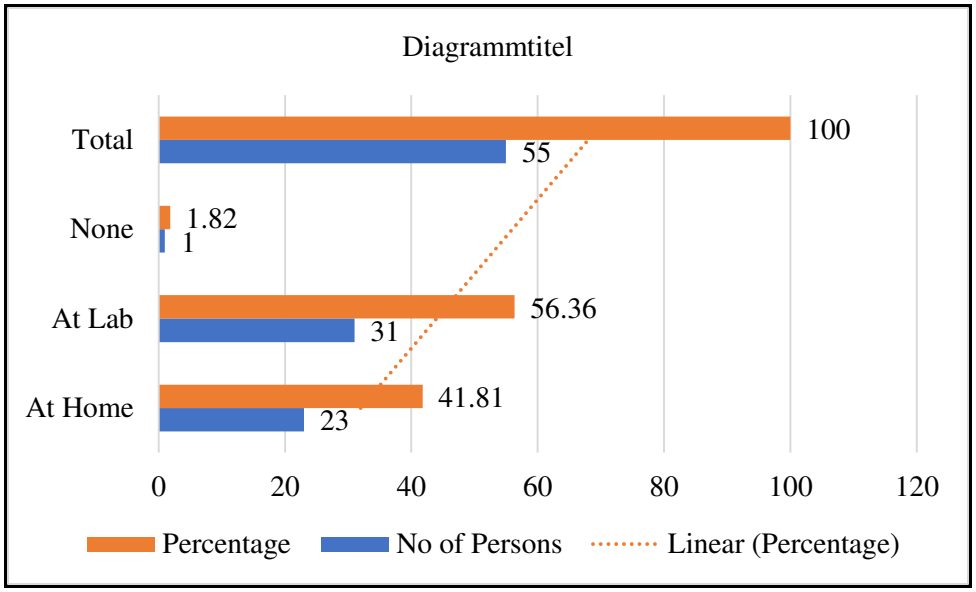



Table No 15: Intervals for checking blood sugar level

| Time Interval | No of Persons | Percentage |
|---|---|---|
| Weekly | 26 | 47.27 |
| Monthly | 13 | 23.63 |
| Occasionally | 16 | 29.09 |
| Total | 55 | 100 |

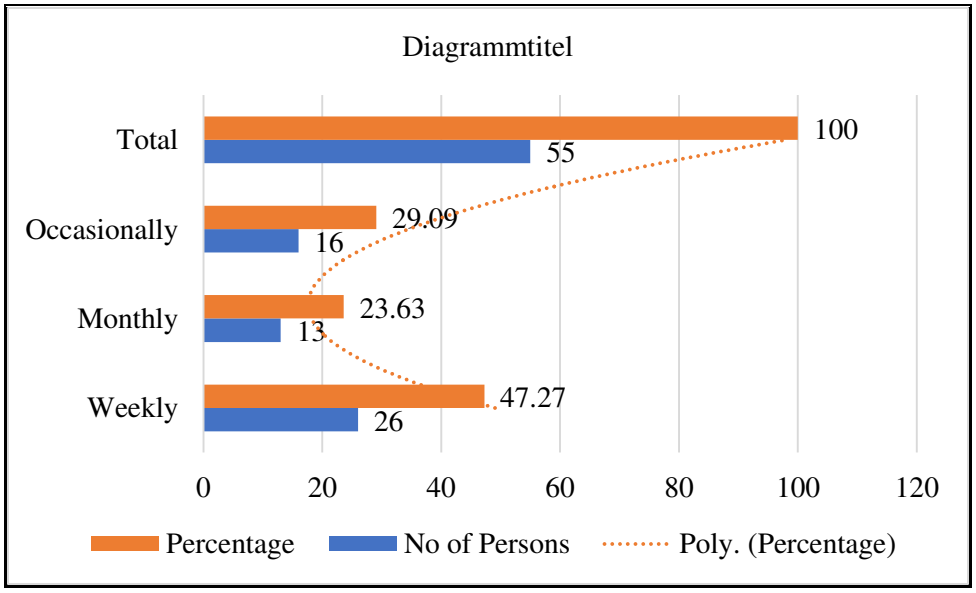


Table No 16: Any exercise routine

| Exercise | No of Persons | Percentage |
|---|---|---|
| Yes | 21 | 38.18 |
| No | 34 | 61.81 |
| Total | 55 | 100 |

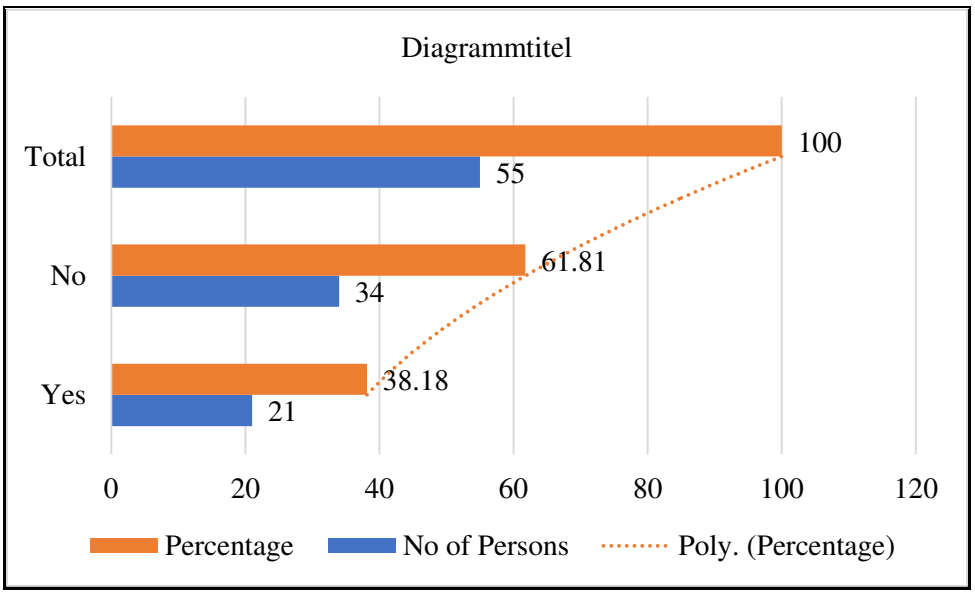



Table No 17: Kin of exercise

| Kind of Exercise | No of Persons | Percentage |
|---|---|---|
| Brisk Walk | 15 | 71.42 |
| Jogging | 0 | 0 |
| Tread Mill | 0 | 0 |
| Others | 6 | 28.58 |
| Total | 21 | 100 |

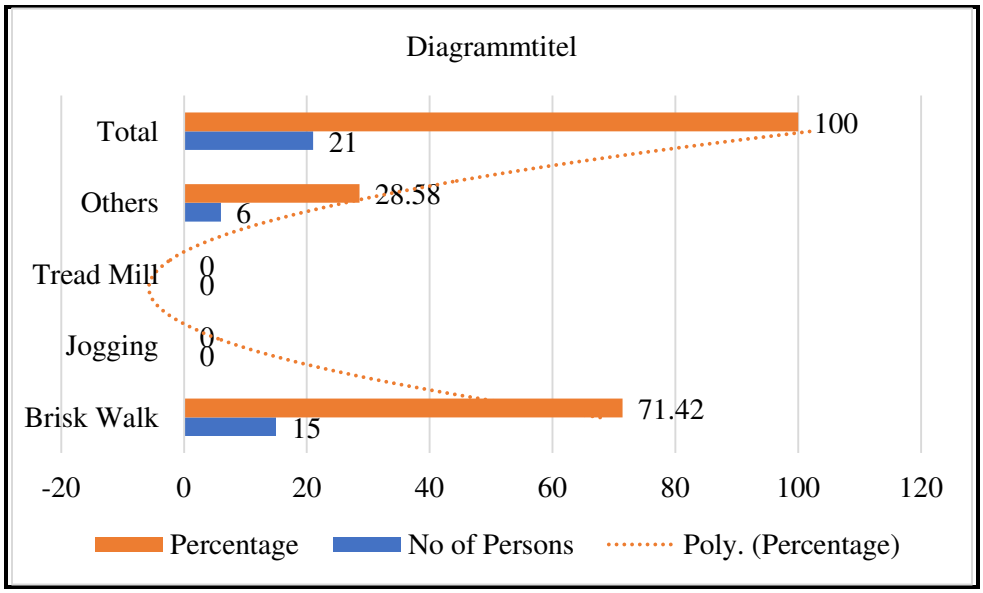


Table No 18: Exercise Duration

| Exercise Duration | No of Persons | Percentage |
|---|---|---|
| < 15 Minutes | 2 | 10 |
| 15 - 30 Minutes | 5 | 23.8 |
| > 30 Minutes | 14 | 66.66 |
| Total | 21 | 100 |

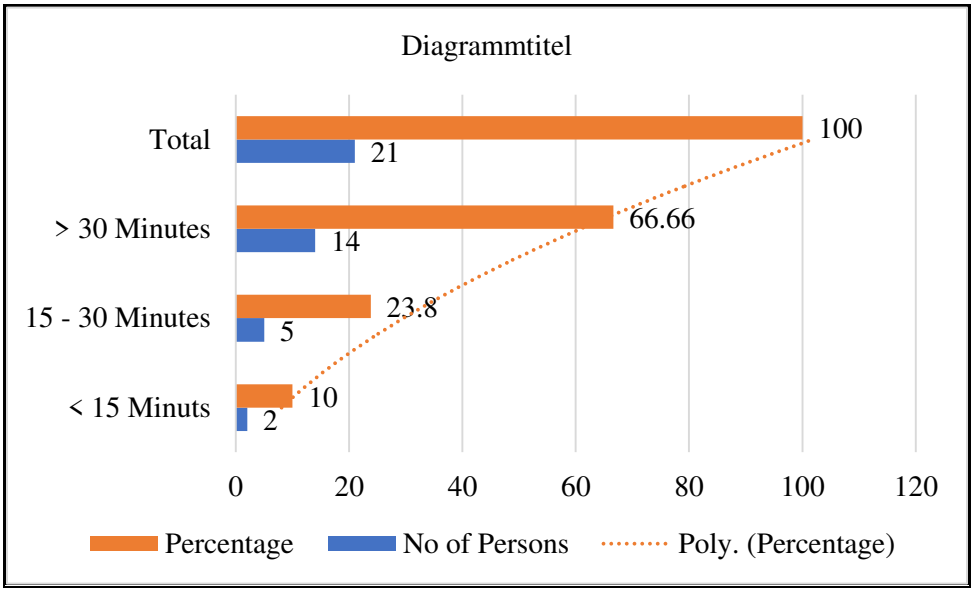



Table No 19: Exercise Days Per Week

| Days per Week | No of Persons | Percentage |
|---|---|---|
| < 3 Days | 3 | 14.28 |
| > 3 Days | 18 | 85.72 |
| Total | 21 | 100 |

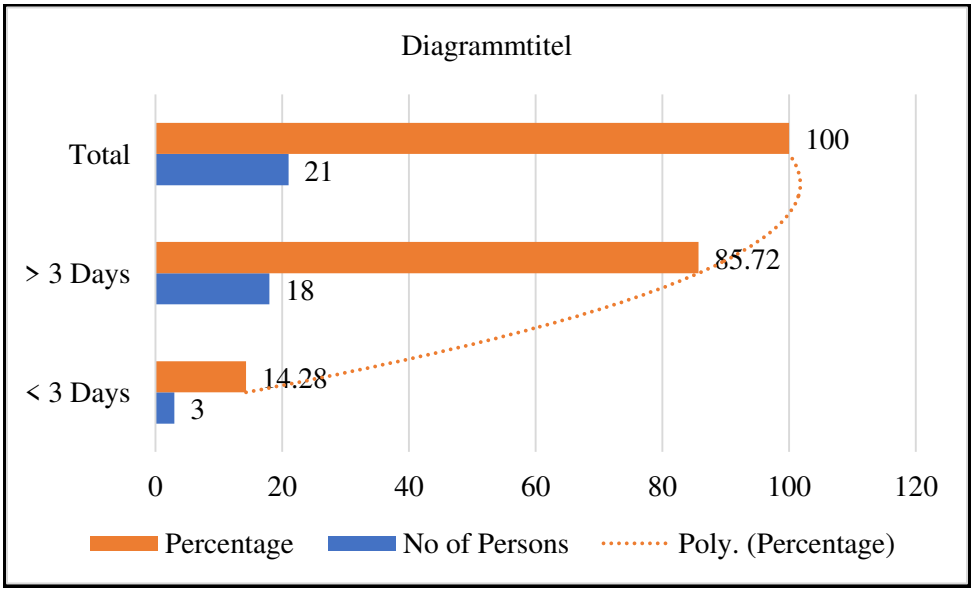


Table No 20: Patients with Diabetic Ketoacidosis

| Diabetic Ketoacidosis | No of Persons | Percentage |
|---|---|---|
| Present | 18 | 32.72 |
| Absent | 37 | 67.27 |
| Total | 55 | 100 |

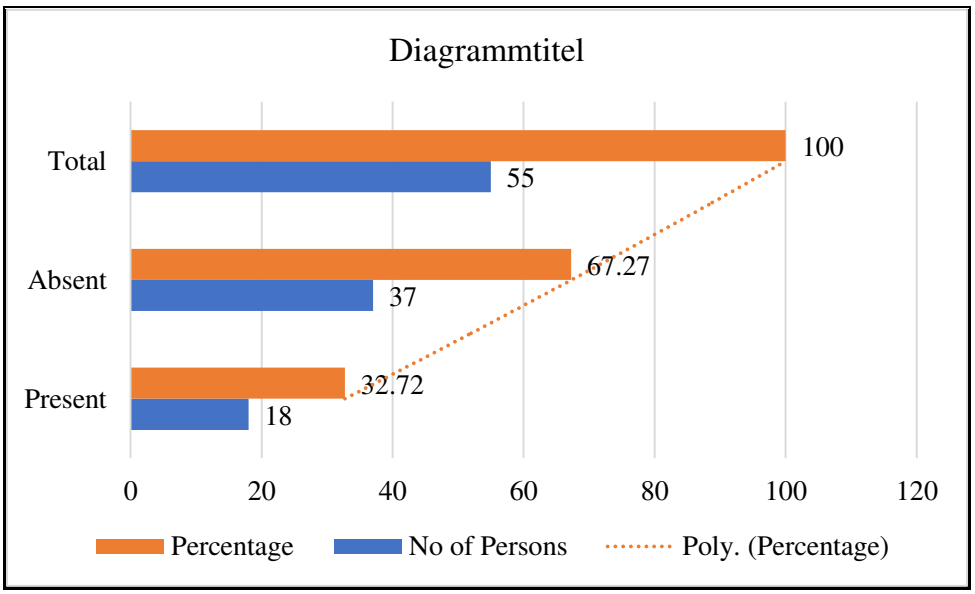



Table No 21: Patients with diabetic nephropathy

| Diabetic Nephropathy | No of Persons | Percentage |
|---|---|---|
| Present | 16 | 29.09 |
| Absent | 39 | 70.9 |
| Total | 55 | 100 |

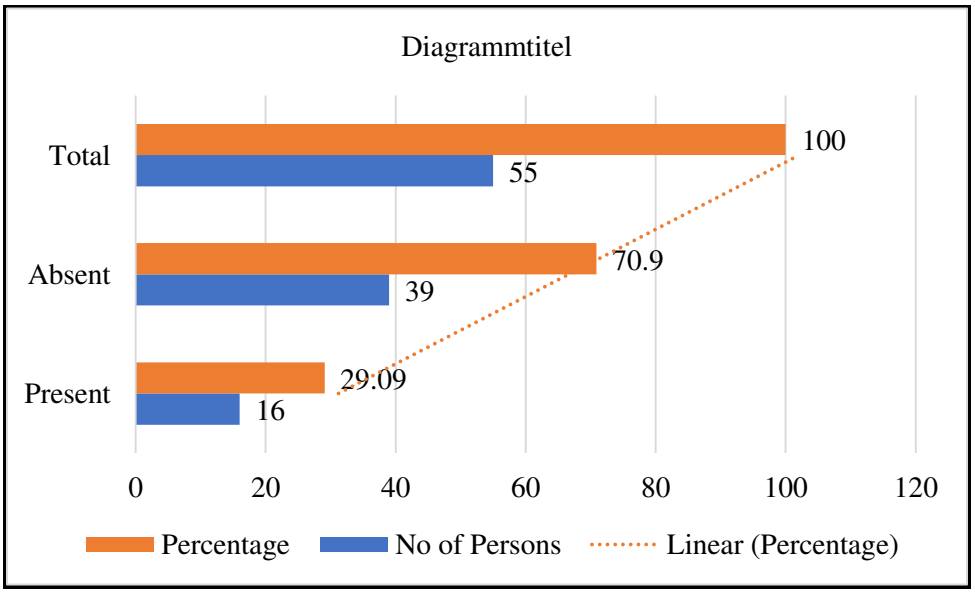


Table No 22: Patients with Diabetic Neuropathy

| Diabetic Neuropathy | No of Persons | Percentage |
|---|---|---|
| Present | 41 | 74.54 |
| Absent | 14 | 25.45 |
| Total | 55 | 100 |

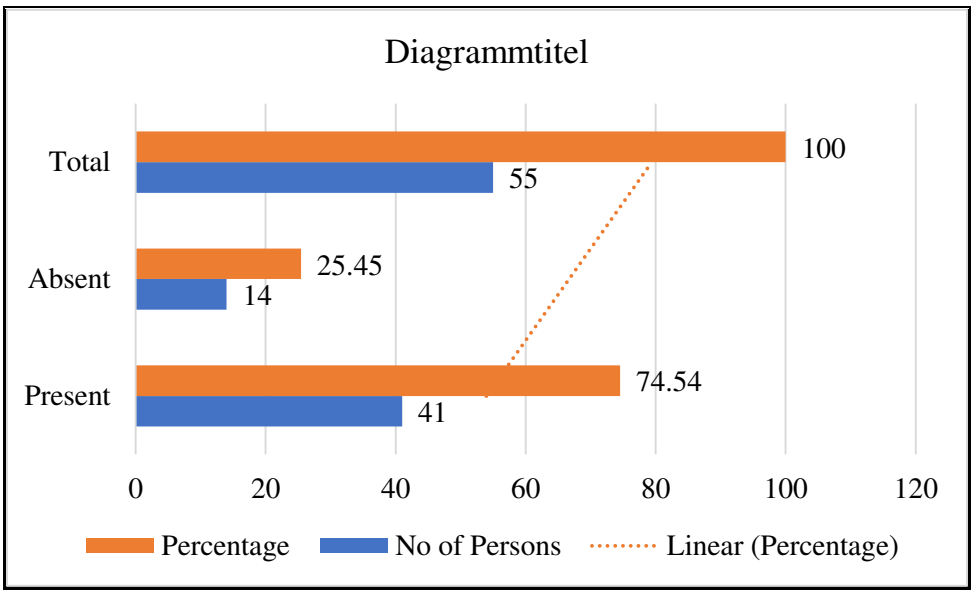



Table No 23: Patients with Diabetic Retinopathy

| Diabetic Retinopathy | No of Persons | Percentage |
|---|---|---|
| Present | 30 | 54.54 |
| Absent | 25 | 45.45 |
| Total | 55 | 100 |

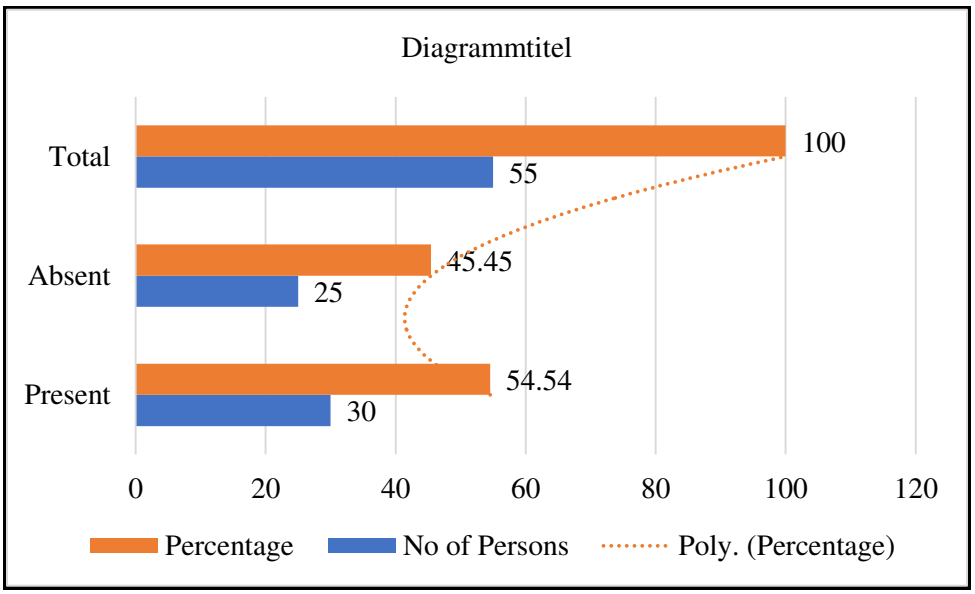
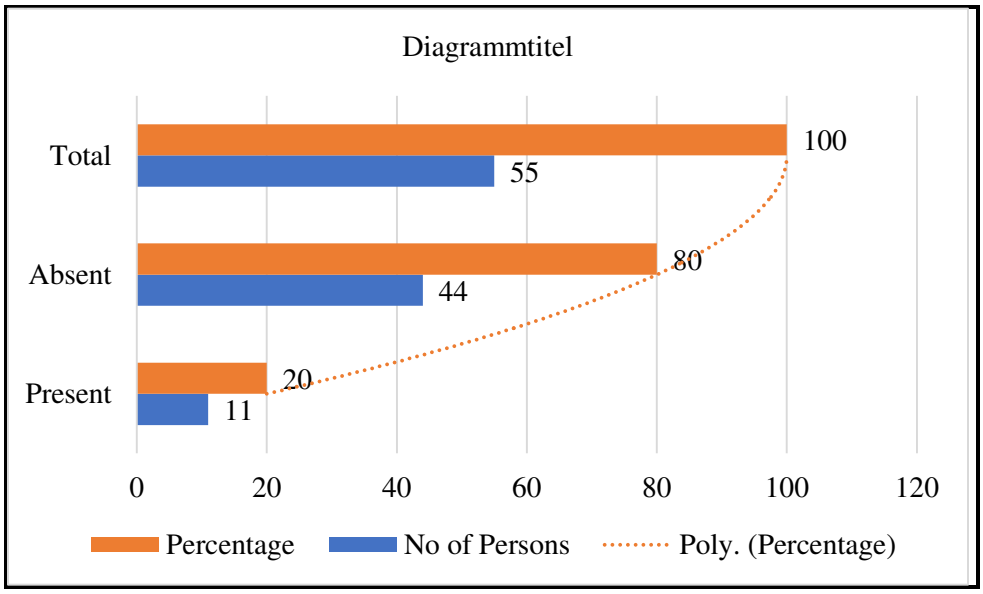


Table No 24: Patients with Diabetic Foot

| Diabetic Foot | No of Persons | Percentage |
|---|---|---|
| Present | 11 | 20 |
| Absent | 44 | 80 |
| Total | 55 | 100 |




**DISCUSSIONS:**

DCCT [Diabetes Control and Complications Trial] was a major clinical study conducted and showed that keeping the blood glucose levels as close to normal as possible slows the onset and progression of eye, kidney and nerve damage caused by diabetes mellitus. DCCT, researchers continued to study more than 90% of participents.8 – 10 The follow up study is called Epidemiology of Diabetes Intervention and Complications [EDIC], is assessing the incidence and predictors of cardiovascular disease events such as heart attack, stroke as well as diabetic complications related to eye, kidney and nerves.21 DCCT study findings showed that intensive blood glucose control reduces 76% risk of eye disease, 50% risk of kidney disease and 60% risk of nerve disease. EDIC study findings are that intensive blood glucose control reduces 42% risk of cardiovascular disease events and 57% reduced risk of non-fatal heart attack, stroke or death from cardiovascular causes. There was a reduced risk of diabetic retinopathy in 76% patients and 54% patients having diabetic retinopathy showed slowed progression.

In 50% patient's kidney disease was prevented and controlled and the risk of nerve damage was reduced by 60%. Elements of intensive management in DCCT included testing of blood glucose level four or more times a day, injecting insulin at least three times daily, adjusting insulin doses according to food intake and exercise, following a diet and exercise plan and making monthly visits to a physician. One study of people with type 2 diabetes mellitus, the United Kingdom Prospective Diabetes Study [UKPDS], demonstrated that controlling blood glucose levels reduced the risks of diabetic eye disease and kidney disease. Some studies of role of blood glucose control in people with diabetes mellitus type 2 are still underway. For example. The Action to Control Cardiovascular Risk in Diabetes [ACCORD] trial, 13 a multicenter randomized trial is studying approaches to prevent major cardiovascular events in individuals with type 2 diabetes mellitus. A cross-sectional population study was performed in a cohort of 890 non-insulin dependents diabetes mellitus [NIDDM] patients residing in the greater Denver metropolitan region. Its purpose was to evaluate the relationship between insulin and oral hypoglycemic agents with regard to metabolic control and diabetic complications. The mean glycosylated hemoglobin for patients treated with insulin was 12 +/- 0.15% versus 11.4 +/- 0.14% for oral hypoglycemic agents. The difference in the fasting blood sugar far the insulin treated group was 195 +/- 3.5 mg/dl versus oral hypoglycemic agents treated group 194 +/- 2.9 mg/dl was not statistically

significant. Categorical increases in urinary albumin excretion were associated positively within insulin versus oral hypoglycemic agent therapy. Patients treated with insulin therapy had a higher frequency of peripheral vascular disease showing insulin therapy 14% and oral hypoglycemic agents 10%. Insulin therapy showed 55% neuropathy and oral hypoglycemic agents 37% Retinopathy with insulin therapy was 71 % and with oral hypoglycemic agents 45%.

Frequency of cardiovascular diseases was equivalent. In summary the NIDDM patients treated with insulin had more nephropathy, retinopathy and neuropathy than did NIDDM patients treated with oral hypoglycemic agents, independent of duration of diabetes. Fasting blood glucose, glycosylated hemoglobin, age and blood pressure level. These in NIDDM patients may be due .0 contributions from worse blood glucose control n m earlier stage in patients and the mitogenic, atherogenic, thrombogenic and vascular permeability effects of insulin. In the observational 4-year study data from 51675 patients in the Swedish National Diabetes Register with the study population mean age of 65.3 years mean diabetic duration of 9.4 years and mean HbA1c level of 7.3%, 28% of patients were receiving metformin alone [OHA] and 24% were receiving Insulin alone and 10% were receiving another oral glucose lowering drug alone [22]. The rest 38% were receiving various combinations of OHA and insulin. Treatment with metformin [OHA] only versus insulin only were associated with significantly increased risks for any cardiovascular disease. Fatal acidosis and serious infection was also significantly greater with insulin alone. Among patients with mild renal impairment metformin [OHA] based treatments were associated with reduced risks for acidosis compared with other treatments. A randomized prospective 6-year study of Japanese patients with non-insulin dependent diabetes mellitus [NIDDM] treated with multiple insulin injection treatment concluded that intensive glycemic control by multiple insulin therapy can delay the onset and progression of diabetic retinopathy, nephropathy and neuropathy in Japanese patients with NIDIJM [23]. In our research of Comparison of Complications among Diabetic patients using Insulin and Oral Hypoglycemics admitted in wards of Allied Hospital Faisalabad, there was a sample of 55 patients out of which 34 patients [61.81%] were taking oral hypoglycemic, 15 patients [27.27%] were taking insulin injections and the remaining 6 [10.90%] were taking a combination of both. All the patients taking oral hypoglycemic were complicated. 26.47% having diabetic ketoacidosis, 26.47% having diabetic nephropathy, 79.41 % having diabetic neuropathy, 58.82% having diabetic retinopathy and 11.76% having diabetic foot. Most of these patients had 1 to 3 of the above-mentioned complications. Out of the 6 patients taking a combination of both 5 [83.34%] were.Out of 15 patients taking injectable insulin, [93.34%] were implicated. 46.67% having diabetic ketoacidosis, 40% having diabetic nephropathy, 73-34% having diabetic neuropathy, 53.34% having diabetic retinopathy and 46.67% having diabetic foot. Most of these patients had 1 to 4 of the above-mentioned implications.

## CONCLUSION:

All the patients taking oral hypoglycemic were complicated compared with 93.34% of the patients taking insulin. Nephropathy and retinopathy were more in OHA taking patients while DKA, nephropathy and diabetic foot more in insulin users.

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