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Research Article

A SURVEY ON MORBIDITY AND MANAGEMENT OF DIABETES IN KOTTAYAM DISTRICT AND A REVIEW ON RECENT DEVELOPMENTS IN DIABETES TREATMENT

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ABSTRACT

Diabetes Mellitus is a chronic disorder characterized by hyperglycemia with or without glycosuria, resulting from an absolute or relative deficiency of insulin. Clinically, diabetes is characterized by a wide spectrum of disorders, ranging from asymptomatic hyperglycemia to abnormalities in various vital organs like heart, brain, retina and peripheral vessels. The present study was conducted among randomly selected 100 patients in Kottayam district. An open survey method was adopted for the study. The aim or motive of the survey was to assess the level of morbidity and management of Diabetes mellitus among the patients. The overall results indicates that an increased common awareness about diabetes & the importance of its management in daily life has to be encouraged for the welfare of the diabetic population all over the country.

Keywords: Diabetes Mellitus, Beta cells, Observational study, Anti diabetic drugs.

INTRODUCTION

The classification of diabetes mellitus and the tests used for its diagnosis were brought into order by the National Diabetes Data Group of the USA and the second World Health Organization Expert Committee on Diabetes Mellitus in 1979 and 1980. Apart from minor modifications by WHO in 1985, little has been changed since that time.

There is however considerable new knowledge regarding the aetiology of different forms of diabetes as well as more information on the predictive value of different blood glucose values for the complications of diabetes. A WHO Consultation has therefore taken place in parallel with a report by an American Diabetes Association Expert Committee to re-examine diagnostic criteria and classification. The present document includes the conclusions of the former and is intended for wide distribution and discussion before final proposals are submitted to WHO for approval. The main changes proposed are as follows.

The diagnostic fasting plasma (blood) glucose value has been lowered to ≥7.0 mmol l^{-1} (6.1 mmol l^{-1}). Impaired Glucose Tolerance (IGT) is changed to allow for the new fasting level. A new category of Impaired Fasting Glycaemia (IFG) is proposed to encompass values which are above normal but below the diagnostic cut-off for diabetes (plasma ≥6.1 to <7.0 mmol l^{-1}; whole blood ≥5.6 to <6.1 mmol l^{-1}). Gestational Diabetes Mellitus (GDM) now includes gestational impaired glucose tolerance as well as the previous GDM.

The classification defines both process and stage of the disease. The processes include Type 1, autoimmune and non-autoimmune, with beta-cell destruction; Type 2 with varying degrees of insulin resistance and insulin hyposecretion; Gestational Diabetes Mellitus; and Other Types where the cause is known (e.g. MODY, endocrinopathies). It is anticipated that this group will expand as causes of Type 2 become known. Stages range from normoglycaemia to insulin required for survival. It is hoped that the new classification will allow better classification of individuals and lead to fewer therapeutic misjudgments. Morbidity and mortality among people with diabetes mellitus are mostly triggered by premature Cardiovascular Disease (CVD). An estimated 285 million adults globally were burdened by this chronic disease in 2010; this number is projected to increase to 439 million by 2030. At least 10.3 million Americans carry a diagnosis of diabetes mellitus and 5.4 million are estimated to have undiagnosed diabetes. Approximately 90% of patients with diabetes have the type 2 variety. There is a lack of consensus regarding the pathogenesis and diagnosis of DC, and a standard treatment has yet to be established. Factors that are recognized to be involved in the pathogenesis of DC include metabolic disorders, myocardial fibrosis, micro vascular disease, autonomic disorders and Insulin Resistance (IR).

Etiology

The etiology of diabetes mellitus can be discussed under two headings as type 1 & type 2 diabetes mellitus

Etiology of type 1 diabetes mellitus

The etiology of type 1 diabetes mellitus is currently the subject of considerable research. Genetic factors are important but do not explain fully about the development of disease. There is a strong immunological component to type 1 DM and a clear association with many organ specific autoimmune diseases. Circulating islet cell antibodies (ICA) are present in more than 70% of type 1 DM at the time of diagnosis. Type 1 DM has been believed to be a disease of sudden onset, but the development now appears to be a slow process of progressive immunological damage.

Etiology of type 2 diabetes mellitus

Type 2 Dm has much stronger genetic relationship than type 1. Identical twins have a concordance rate approaching 100%. This suggests relative importance of inheritance over the environment. If a patient has type 2 DM, the risk of a child eventually developing type 2 DM is 5-10% compared to 1-2% for type 2 DM. Obesity is associated with hyper insulineamia and marked insulin insensitivity and a decrease in the number of insulin receptors. It has also been suggested that there is a selective defect in beta cell secretory mechanism which prevent it from responding normally to glucose.

CLINICAL FEATURES

General symptoms

Polyurea
Nocturea
Symptoms of salt and water depletion: Thirst, dizziness, cramps etc…
Tiredness
Altered visual sensitivity
Infections: vulvovaginal, gangrene, infection of skin and nails

Specific for type 1 dm:

Sudden weight loss accompanied by nocturea, polyurea, polydypsia

Increased appetite
Muscular atrophy of thigh
Smell of acetone in breath
Overwhelming fatigue

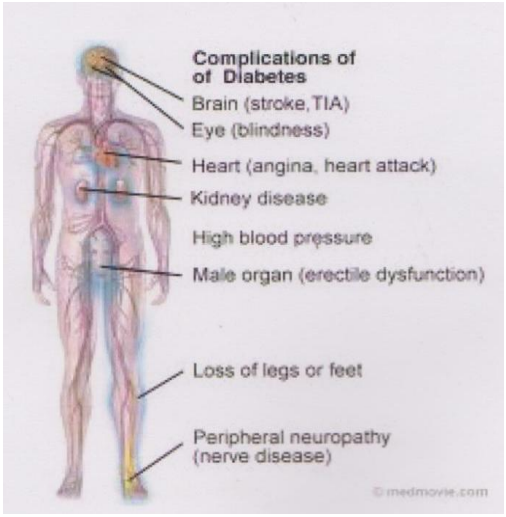
Specific for type 2 dm

Gastro intestinal disturbances
Genital candidiasis, urinary tract/ skin infections
Nocturea, polydypsia, polyurea, sleep disturbances

Complications

All forms of diabetes increases the risk of long term complications. These typically develop after many years (10-20), but may be the first symptoms who have otherwise not received a diagnosis before that time. The major long term complications relate to damage to the blood vessels. Diabetes doubles the risk of cardiovascular disease. The macro vascular disease are (related to the atherosclerosis of large arteries) are the ischemic heart disease (angina & myocardial infarction), stroke and peripheral vascular disease.

Fig 1: complications of diabetes.



Diabetes also damages the capillaries (cause microangiopathy). Diabetic retinopathy, which affects the blood vessel formation in retina of eye, can lead to visual symptoms, reduced vision and ultimately blindness. Diabetic nephropathy, the impact of diabetes on kidneys associated with protienurea & ultimately chronic kidney disease requiring dialysis. Diabetic neuropathy causing numbness, tingling and pain in the feet. The one other important complication is diabetic foot ulcer characterized by gangrene.

Pathophysiology

Insulin is the principal hormone that regulates the uptake of glucose from the blood into most cells (primarily muscles and fat cells, but not CNS cells). Insulin is released into the body by beta cells found in the islet of Langerhans in the pancreas, in response to rising level of blood glucose, typically after eating. Therefore, deficiency of insulin or the insensitivity of its receptors plays a central role in all forms of diabetes mellitus. The pathophysiology of diabetes mellitus can be summarized as follows:

New medications

DPP-4 inhibitors include the oral drugs Januvia, Nesina, Onglyza, and Tradjenta. These protect a natural compound in the body -- GLP-1 -- from breaking down. GLP-1 helps lower blood glucose.

Incretin mimetics or GLP analogs include the injected drugs Byetta, Tanzeum, and Victoza. They use the body's own signaling system to boost insulin after meals.

Sodium-glucose co-transporter 2 (SGLT2) inhibitors work by blocking glucose from being reabsorbed by the kidneys. That raises the amount of glucose urinated, and lowers the amount of glucose in the blood. Currently, Invokana (canaglifozin) is the only drug in this class that's approved by the FDA. More SGLT2 inhibitors are being developed.

Other drugs include Symilin, an injectable synthetic hormone. It helps lower blood sugar after meals in people with diabetes who uses insulin.

Combination drugs have made a difference. They join different medications in one pill often metformin and a sulfonylurea, a meglitinide, a DPP4 inhibitor, a thiazolidinedione, or a thiazolidinedione in combination with a sulfonylurea. This cuts down the number of pills a person has to take. Combination drugs include Actoplus MET, Avandamet, Duetact, Glucovance, Metaglip, Kazano, Oseni, and PrandiMet. There can be drawbacks. They tend to cost more than generic drugs. They can also make it harder to fine-tune the treatment. When you have a combination drug, you can't adjust the dose of one drug without adjusting the other too.

New types of insulin allow some people to take just one injection of long-acting insulin each day. That can be much easier than multiple injections of standard insulin, says Cypess.

Future medications Other classes of medication are in development. One type doesn't affect insulin, unlike most diabetes drugs. It blocks the body from reabsorbing glucose from urine. While the FDA has not approved any drug from this class, it could in the future.Despite the advances; many people with diabetes have probably not changed their prescriptions much over the last decade. In some ways, there's been a lot of consistency. Metformin and the sulfonylureas [such as Amaryl, DiaBeta, Diabenese, Glucotrol, Glynase, and Micronase] and metformin are still the most commonly prescribed drugs for diabetes and they've been around for a long time. While the new drugs may not have replaced the old, they have added options for people who had problems controlling blood sugar with standard drugs.

Research highlights

A Close-Up View of Glucose Transport

Association-funded researcher Dr. Tamir Gonen recently published a critical study that provides the information needed to design new diabetes drugs. But it almost didn't happen.

A Genetic Link to Type 2 Diabetes in Obesity

Although obesity is known to be a significant risk factor for developing type 2 diabetes, most obese people never develop diabetes. An Association-funded researcher aims to understand what factors contribute to diabetes risk in the setting of obesity.

Reducing Cardiovascular Disease Risk in Youth with Type 1 Diabetes

While insulin resistance is known to contribute to cardiovascular disease in type 2 diabetes, its role in type 1 diabetes has been less clear. Association-funded researcher Dr. Kristen Nadeau aims to understand how to reduce cardiovascular complications in type 1 diabetes.

Progress in Artificial Pancreas Development: Preventing and Treating Low Blood Glucose

An important limitation to development of an artificial pancreas is the danger of low blood glucose caused by insulin infusion. A recent study links automated glucagon delivery to combat low blood glucose to automated Insulin delivery to overcome this issue and bring artificial pancreas technology closer to reality.

Diet during Pregnancy Affects Offspring Later in Life

A number of studies connect conditions in the womb to the health of the offspring. A recent study shows that a high-fat diet during pregnancy and lactation makes offspring suffer increased negative effects of high-fat diet as adults. Interestingly, these effects are not linked to inherited genes.

Type 2 Diabetes Gene Acts through Neighboring Pancreas Cells

Beta cells in the pancreas are known to secrete insulin to regulate blood glucose. A recent study shows that one gene linked to type 2 diabetes actually works in the delta cell, a neighboring cell type within the pancreas, which helps "remotely" control insulin and glucagon production in beta and alpha cells, respectively.

Uncovering a New Key to Increased Heart Disease Risk in Diabetes

People with diabetes have double the risk of heart attack and stroke. A recent series of studies reveals how insulin resistance leads the walls of arteries to become thicker and increases stroke risk, as well as how an existing diabetes medication works to counteract this risk.

The Obesity Paradox - Does Excess Weight Improve Survival?

How is body weight linked to death rates among people with type 2 diabetes? Recent studies have surprisingly suggested longer life for overweight or obese people with type 2 diabetes. However, a new study provides a more conclusive answer to this puzzling question.

Mother's Diet Affects Brain Development and Metabolism in Offspring

New evidence suggests that the environment in the womb has long lasting effects on the offspring. One recent study shows how a mother's diet during pregnancy affects risk for obesity and diabetes in offspring through changes in brain development.

From stem cells to billions of human insulin producing cells

Harvard stem cell researchers today announced that they have made a giant leap forward in the quest to find a truly effective treatment for type 1 diabetes, a condition that affects an estimated 3 million Americans at a cost of about $15 billion annually:

With human embryonic stem cells as a starting point, the scientists are for the first time able to produce, in the kind of massive quantities needed for cell transplantation and pharmaceuticalpurposes, human insulin producing beta cells equivalent in most every way to normally functioning beta cells.

Biopharmaceutical research companies are developing 180 medicines to treat diabetes and related conditions

To build on progress to date and help further meet the challenges posed by diabetes, America's biopharmaceutical research companies are developing 180 new medicines for type 1 and type 2 diabetes and diabetes-related conditions, such as chronic kidney failure due to diabetes and painful diabetic neuropathy. Additionally, there are 200 active diabetes clinical trials in the United States, including 140 that have not yet started recruiting patients or are just now seeking volunteers to participate and another 60 that are active, but not recruiting new patients. In addition to the critical role these trials play in the development and testing of new treatments, they represent potentially valuable therapeutic options for patients battling diabetes and diabetes-related condition.

METHODS

Study technique: survey

Our team includes three members. The survey was carried out among 100 diabetic patients selected randomly from 5 different places in Kottayam district namely changanassery, pala, kanjirapally, pampady & Kottayam town. We personally interviewed the patients & collected the data. The study duration was 1 month (November 2014)

Study design: observational study

The data entry form for the survey consists of 26 objective questions based on the following details:

Personal data
Morbidity due to diabetes
Management of the disease

After the completion of survey the data was combined & analyzed using MS office software.

RESULTS

Observation & interpretation

Based on the survey conducted on random population including 100 subjects, it was observed that there is a considerable morbidity among the diabetes patients. The included in the geriatric age group was mostly suffered. Also this group was having increased occurrence of other diseases like hypertension, hyper cholesterolemia or other some chronic condition. Also the symptoms like fatigue, pain, thirst, dry mouth, anorexia, nausea & vomiting, abdominal pain, gangrene/unhealing wounds, morning headaches etc... was observed among a considerable number of patients. The secondary symptoms like nightmares, nightsweats, lightheadedness, shakiness/weakness, intense hunger, fainting etc... was observed among only a small number of subjects.

Regarding management of diabetes somewhat reasonable compliance was observed from the overall subjects, but more improvement is required for considerable morbidity reduction. From the survey results it is obvious that most patients understand the seriousness of the disease and the importance of its management. Many subjects are suffering from considerable morbidity mainly due to poor diet control and lack of exercise. Although compliance is observed in medication routine and checkup, compliance towards the diet control and personal management is found to be poor. This is reflecting in the increased prevalence of morbidity. Relevant data obtained from the survey is illustrated in the form of suitable graph on the following pages.

General patient data

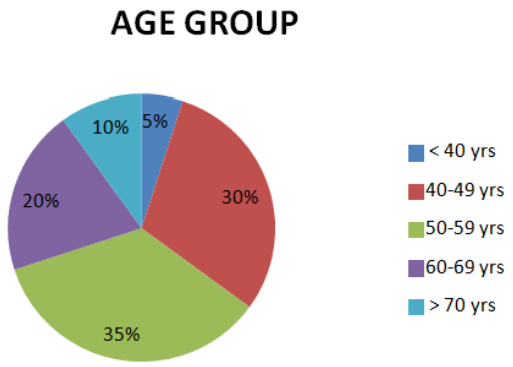


Fig 2: Age group of people being diabetic.

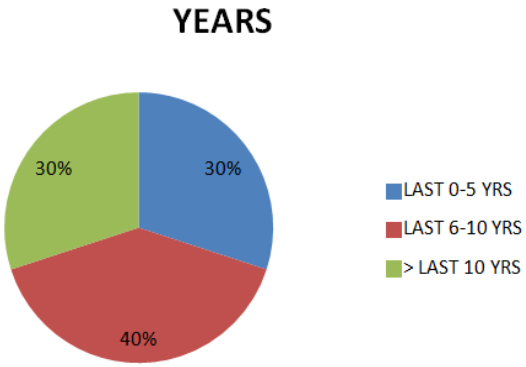


Fig 3: Time since diabetic.

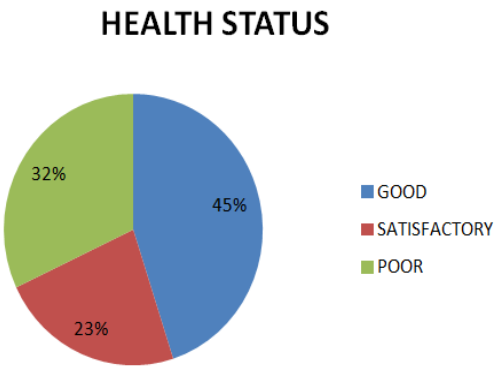


Fig 4: Health condition of the patients

Morbidity data

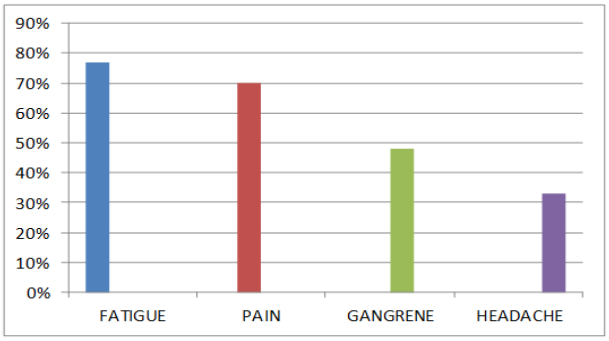


Fig 5: Primary symptoms –graph 1.

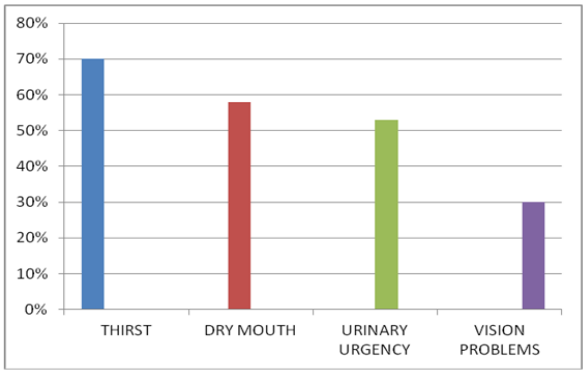


Fig 6: Primary symptoms-graph 2.

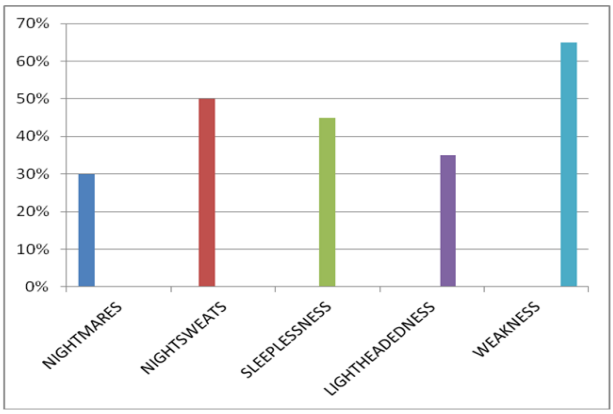


Fig 7: Secondary symptoms.

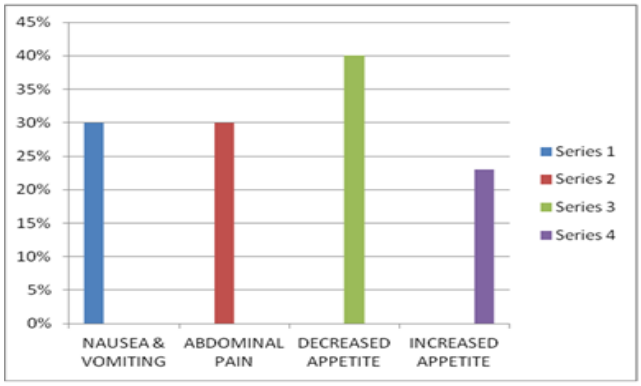


Fig 8: Gastrointestinal symptoms

Diabetes management data

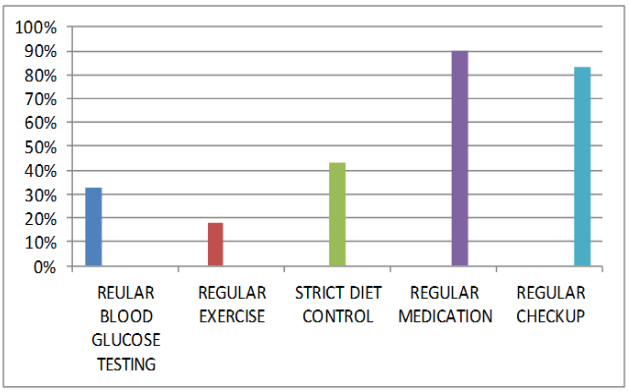


Fig 9: Assessment of personal management.

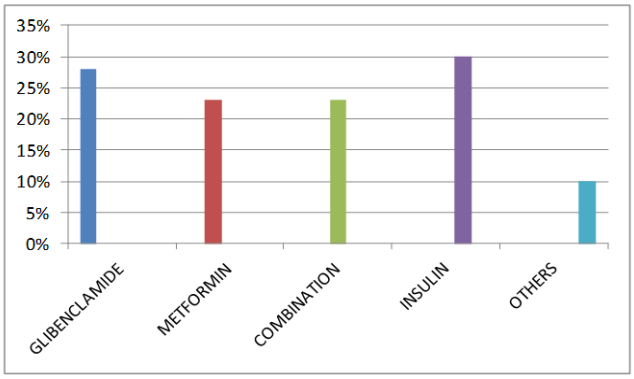


Fig 10: Drugs taken by the patients.

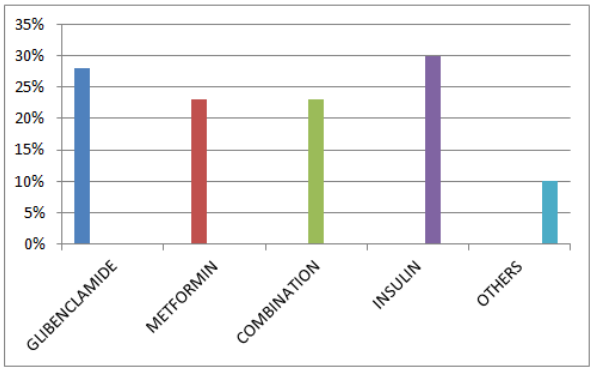


Fig 11: Assessment of brittleness in glucose management & hospitalization in past six months.

All the above graphs are illustrated based on the data obtained from random survey among 100 patients selected in Kottayam district.

DISCUSSION

The present study was conducted among randomly selected 100 patients in Kottayam district. An open survey method was adopted for the study. The aim or motive of the survey was to assess the level of morbidity and management of Diabetes mellitus among the patients. And results showed the following:

The most common age group seen in diabetes is 50-60yrs followed by 40-50 yrs, indicated by 35% & 30% respectively of the survey population. The other age groups are also represented by considerable percentage. The patients below 40yrs of age are considerably less when compared to other age groups.There are many patients who are diabetic for last 5-10 & also greater than 10- yrs.

This indicates considerable management of the condition. And also 45% of the selected diabetic population comments that their health condition is good and 23% as satisfactory.

Regarding morbidity associated with the disease, most patients are affected with the difficulties of fatigue, pain, thirst etc… About 70% of the survey population is suffering from the above common conditions. The other main difficulties which stand in second position are dry mouth, urinary urgency, gangrene, weakness etc… About 50% of the survey population is suffering from these respectively. The other minor morbidities affect about 30% of the survey population.

Assessment of management of diabetes shows that about 80-90% of the population has got the medication compliance and regular medical checkup. The diet control is correctly followed by only 43% of the survey population. Regular blood glucose testing and exercise are followed by still lesser portion of the survey population.

Regarding the drugs taken by the patients, 30% of the patients in survey was taking Insulin, 28% of patients taking Glibenclamide, Metformin by 23%, combination regimen by 23% and 10% of the population was taking other drugs.

The brittleness in the blood glucose management was assessed by past six month's history before the survey time period. About 65-80% of the survey population has got uncontrollable rise in blood glucose level & hospitalization in past 6 months. Also the events of hypoglycemia are not uncommon.

CONCLUSION

The most of the patients found to be diabetic was in the 50-60yrs age group & the second position was occupied by 40-50yrs age group. Considerable management was indicated by the patients who are diabetic for past 10 & also greater than 10yrs. About 45% of the diabetic patients under survey comment that their health condition is good & 23% as satisfactory. This further supports the above statement. The most common morbidities/difficulties among diabetics are fatigue, pain, thirst & weakness affecting about 70% of the survey population. The other minor difficulties such as dry mouth, gangrene, urination urgency, sleep disturbances are affecting about 50% of the survey population. About 80-90% of the patients under survey are following regular medication & medical checkup. Main drawbacks in the diabetes management are found to be lack of good diet control, exercise & regular blood glucose monitoring. About 30% of the patients under the survey are in Insulin therapy. The most prescribed oral anti diabetic drug is Glibenclamide & secondly Metformin HCL.

The combination regimen is taken by about 23% of the survey population. In spite of all the efforts, brittleness is observed blood glucose management indicated by uncontrolled blood glucose level rise & hospitalization of about 65-80% of the cases under the survey. The overall results indicates that an increased common awareness about diabetes & the importance of its management in daily life has to be encouraged for the welfare of the diabetic population all over the country.

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