



## **Knowledge And Awareness on Various Treatment Modalities of Diabetes Mellitus -A Observational Survey**

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### **ABSTRACT**

**Introduction:** Diabetes mellitus (DM) is a group of metabolic disorders characterized by a high blood sugar level over a prolonged period of time. Patients suffer from various problems as a result of inadequate glycemic control. There are several treatment modalities available for treating control glycemia. However, many diabetic patients may not be aware of these options. This study was conducted to assess the knowledge and awareness on various treatment modalities of diabetes mellitus.

**Materials And Methods:** A set of self designed questionnaires of 21 questions were framed and was circulated among diabetic patients through google forms link. The sample size that was chosen for the study was 100. The criteria used for choosing sample's were chronic diabetic patients, middle and old age people. The questions were prepared and then analysed thoroughly before sharing the google forms link online. The result output variables were collected and represented in pie charts. Descriptive statistics and Chi square test were used to analyse the data obtained.

**Results:** In the present study, Out of total participants 60.6% were Male and 39.4% were Female. 27.5% of the population were suffering from diabetes mellitus from past 1-5years-, 52.3% of the population were having diabetes mellitus from past 5-10 years and 20.2% of the population were having diabetes mellitus for > 10 years. 56.9% of diabetic patients were using metformin as the preliminary drug for the treatment of diabetes mellitus and 43.1% of patients were not using it. Majority of diabetic patients were prescribed glipizide as the drug of choice in the treatment of diabetes mellitus. 33% of diabetic patients were using glipizide, 25.7% of diabetic patients were using glibenclamide & glibenclamide and 15.7% patients were not using any of them.

**Conclusion:** Patients with diabetes haad fair knowledge and awareness about the different treatment modalities. Metformin, Glipizide (sulphonylureas) was preferred drugs for diabetes mellitus.

**Keywords:** Diabetes Mellitus, Treatment of choice, Etiology, Antidiabetic drugs, Innovative technique.

### **INTRODUCTION**

Diabetes mellitus (DM), commonly known as diabetes, is a group of metabolic disorders characterized by a high blood sugar level over a prolonged period. Symptoms often include frequent urination, increased thirst, and increased appetite. If left untreated, diabetes can cause many complications.(1) Acute complications can include hyperosmolar hyperglycemic state, diabetic ketoacidosis, or even death. Diabetes Mellitus mostly affects middle-aged and elderly people. Diabetes condition occurs mainly due to either the pancreas not producing enough insulin or the cells of the body not responding properly to the insulin produced. Two main types of diabetes Mellitus are type 1 and type 2. The occurrence of gestational diabetes is not common as it occurs mainly in pregnant women (MathType 1 diabetes) (T1D) previously known as juvenile diabetes, is a form of diabetes in which very little or no insulin is produced by the islets of Langerhans (containing beta cells) in the pancreas. Algorithms for the treatment of diabetes highlight the need for good glycaemic control to reduce the development or progression of diabetes complications. In recent years has increased the number of hypoglycemic agents available for the treatment of T2DM. A recent position statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD) on a patient-centered approach in the management of patients with T2DM[6] gives an overview on how different conditions

and comorbidities may influence the choice of different hypoglycemic agents.(2)Type 2 diabetes (T2D), formerly known as adult-onset diabetes, is a form of diabetes that is characterized by high blood sugar, insulin resistance, and relative lack of insulin. Common symptoms unexplained weight loss, Increased urination frequency, and increased thirst. Normal random blood sugar is 90-12 mg/dl and when Hb1Ac blood sugar test shows greater than 140 mg/dl it indicates acute diabetes mellitus (3).

The previous research showed that organizing care of type 2 diabetes in a structured way encourages better metabolic control despite less use of oral medication and among the patients a greater knowledge of their disease. premixed insulin analogs were mostly used in terminal stages of Diabetes Mellitus as a mode of treatment. (4) Also controlling blood sugar through diet, exercise, oral medication or insulin is the main treatment. Metformin is generally the preferred initial medication for treating type 2 diabetes unless there's a specific reason not to use it. Metformin (oral drug ) is effective, safe, and inexpensive. It may reduce the risk of cardiovascular events. Metformin also has beneficial effects when it comes to reducing A1C results (5). Diet mixed with fruits (bananas) and vegetables (spinach) and eggs is included in the daily food intake of the patients.(6) Challenges faced by the previous research articles were the preference of treatment was biased in a particular region. The sole purpose of this research is to analyse the knowledge and awareness of treatment modalities of diabetes among the Indian population. The objective of this study is to increase the awareness about DM treatment modalities (the type of drug usage) among the population.

Our team has extensive knowledge and research experience that has translated into high quality publications (7).(8–21) ,(22–26) . Most of the previous research work included the only collection of data through hospital surveys and the present work included the treatment of choice for diabetes mellitus chosen by diabetic patients. The main objective of this study is to know the different types of drugs chosen as a treatment modalities for Diabetes Mellitus and its reason and common protocol which is followed.

## **METHODOLOGY**

### **Study design/Setting**

The study was designed to find the comparison of treatment modalities of diabetes mellitus of 109 Indian rural population. A well-structured Questionnaire on the basis of personal information, Duration, and choice of treatment taken by diabetic patients were taken into consideration. Measures were taken to check both internal and external validity. The nature and purpose of the study were explained and strict confidentiality was measured.

### **Participants Recruitment**

\*All the participants must have been diagnosed with diabetic mellitus (hypoglycemic condition)

\*Participants were chosen from the nearby known circle and friends

\*The participants must be aware of the type of drugs used as a treatment for diabetic mellitus.

\*Sampling was performed through online mode and survey links.

Both male and female subjects of age group 10-60 years were selected. This is an online-based survey study. The sampling method used was a simple random sampling method.

### **Development of questionnaire**

The questionnaire was prepared after thorough analysis of drugs available & used commercially for treating diabetic patients.The questions were prepared manually and corrected by guide.The questionnaire framework was based on the previous studies and several specific alterations were done to make the questionnaire relevant to the present study. After preparation, the questionnaire's was validated and checked for reliability using kappa analysis. 21 questionnaires were prepared regarding the diabetic drugs treatment and duration of the treatment and were circulated through Google forms. The responses were exported to Google sheets and coding was done.

### **Dependent/Independent Variable**

Independent variables are Age, Sex, Occupation. Dependent variables were treatment protocol and blood sugar level.

### **Survey procedure**

The questionnaire was feeded in google forms and was circulated through online by means of various social media majorly through WhatsApp,the link was tracked until the responses gained were hundred in number.The questionnaires was followed and shared multiple times to increase the response rate.The advantages are it is economic, easy to create, and can have a wide reach. The disadvantages are that it has survey fatigue and response bias.

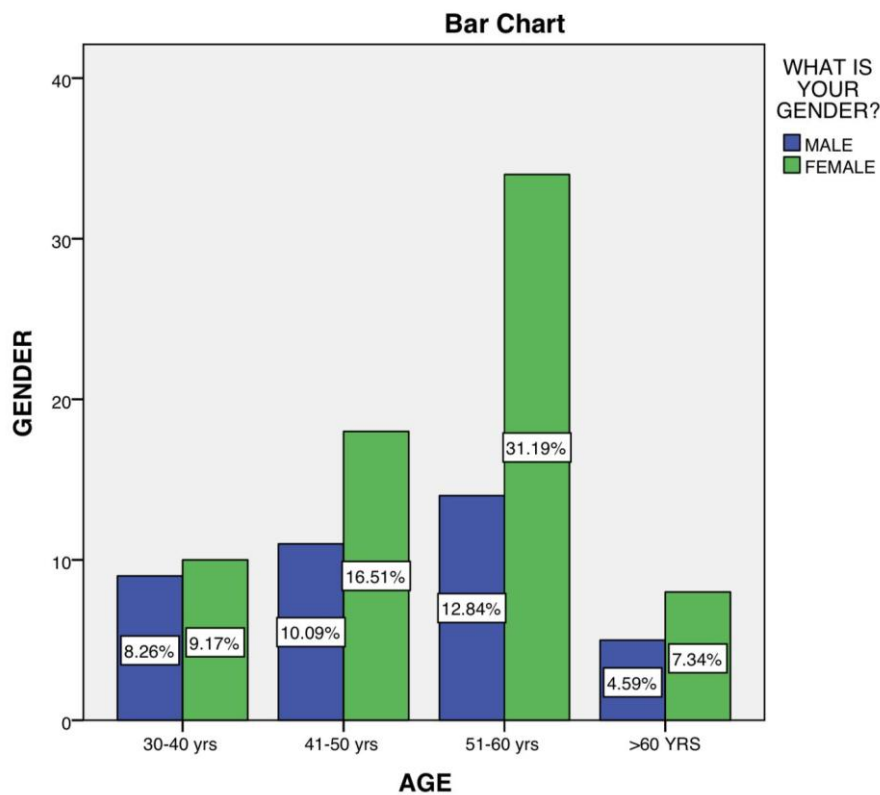
**Statistical analysis**

The result output variables were collected and were represented in pie charts. The statistics used to analyze the results were descriptive statistics and independent t-tests using spss software.

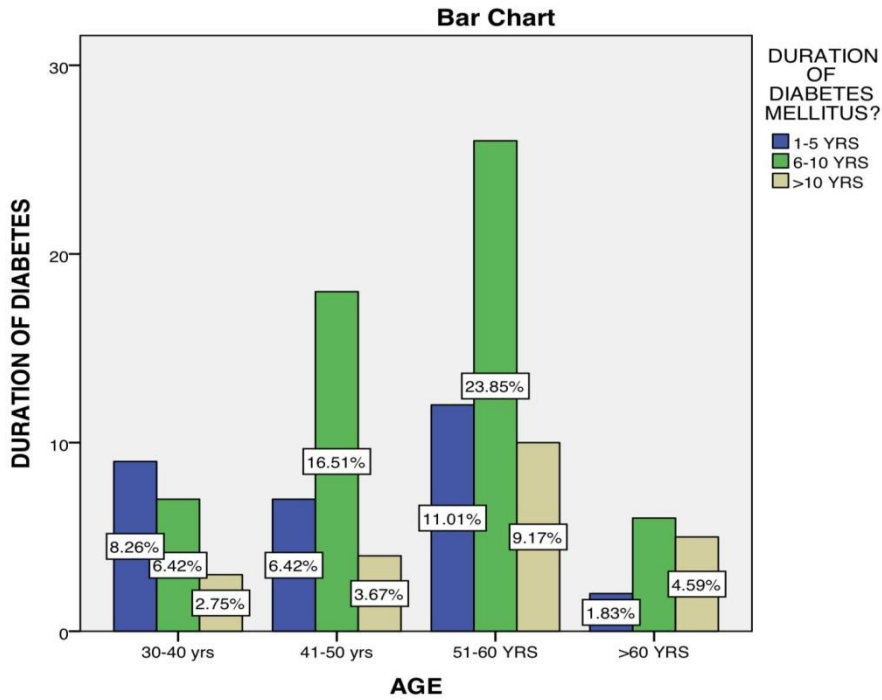
**RESULTS**

Among the 41-50 years age group 10.09% of patients were male and 16.51% of patients were female. Among the 51-60 years age group 12.84% of patients were male and 31.19% patients were female. For patients with age greater than 60 years,4.59% were male and 7.34% were female.Hence, the Majority of diabetic patients were female (31.19%) between 51 and 60 years.Figure 2:Among 41-50 years age group 6.42% of patients were suffering from diabetes for 1-5 years,16.51% patients were suffering from diabetes for the past 6-10 years and 3.67% patients were suffering from diabetes for greater than 10 years. Among the 51-60 years age group 11.01% of patients were suffering from diabetes for 1-5 years,23.85% patients were suffering from diabetes for the past 6-10 years and 9.17% patients were suffering from diabetes for greater than 10 years. For patients whose age is greater than 60 years,1.83% patients were suffering from diabetes for 1-5 years,7.34% patients were suffering from diabetes for the past 6-10 years and 4.59% patients were suffering from diabetes for greater than 10 years. Hence, the majority of diabetic patients were suffering from diabetes for the past 6-10 years (23.85%) in the 51-60 years age group.Figure 3:Among the 41-50 years age group 17.43% of patients were having type 1 and 9.17% patients were having type 2. Among the 51-60 years age group 18.35% patients were having type 1 and 25.69% patients were having type 2.Patients with age greater than 60 years,6.42% were having type 1 and 5.50% were having type 2. Hence, the majority of diabetic patients were having type 2 diabetes mellitus (25.69%) between 51 and 60 years. Among the 41-50 years age group 12.16% of patients responded yes,11.93% responded no and 2.75% responded maybe. Among the 51-60 years age group 8.26 % of patients responded yes,21.10% responded no and 14.68% responded maybe. For patients with age greater than 60 years,2.75% of patients responded yes,8.41% responded no and 4.59% responded maybe. Hence, the majority of diabetic patients don't know their family history of diabetes mellitus (21.10%) in the age group 51-60 years.

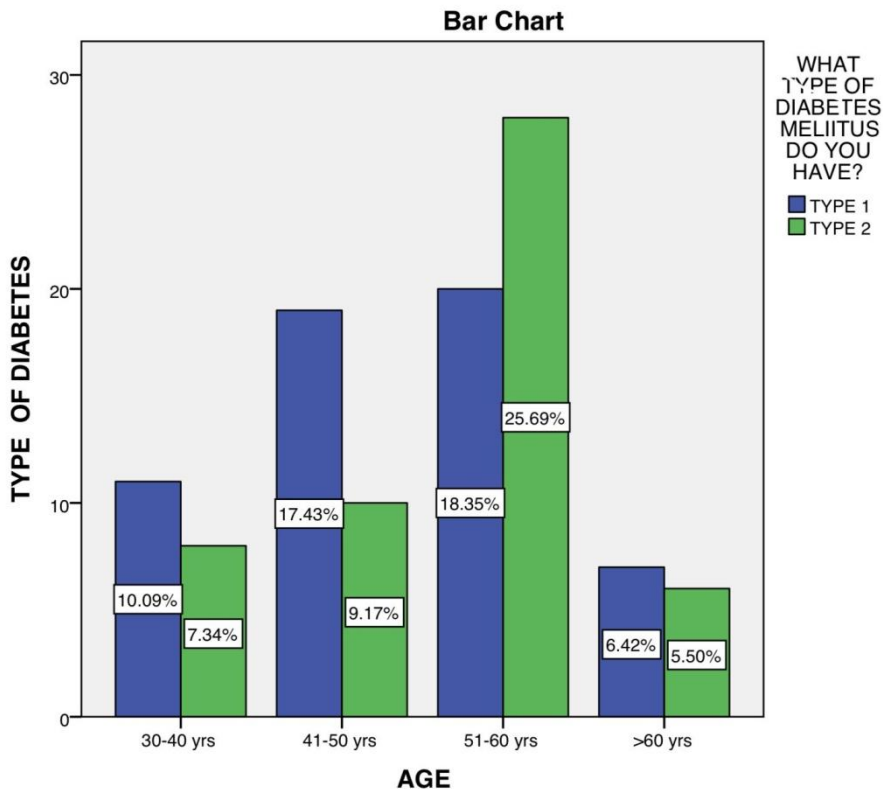
**Graphical Representation**



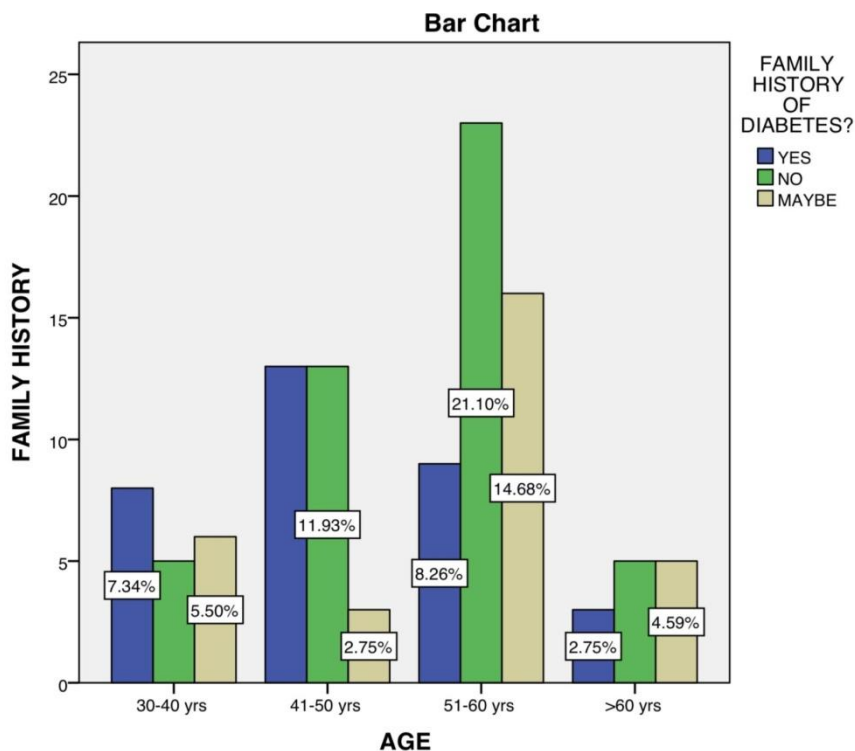
**Figure 1:Bar graph showing the descriptive data of the distribution of diabetic patients based on their Gender. Graph analysis shows that among the 51-60 years age group 12.84% of patients were male (blue) and 31.9% were female (green).**



**Figure 2:Bar graph showing the distribution of diabetic patients based on the duration of diabetes. Graph analysis shows that among the 51-60 years age group 11.01% of patients were suffering from diabetes for the past 1-5 years (blue), 23.85% patients were suffering from diabetes for the past 6-10 years (green) and 9.17% patients were suffering from diabetes for greater than 10 years (yellow).**



**Figure 3:Bar graph showing the distribution of diabetic patients based on their type of diabetes mellitus. Graph analysis shows that among the 51-60 years age group 18.35% of patients were having type 1 (blue) and 25.69% were having type 2 diabetes mellitus(green).**



**Figure 4: Age-wise distribution of family history of diabetes mellitus in DM patients. Bar graph showing the distribution of diabetic patients based on their family history of diabetes mellitus. Graph analysis shows that among the 51-60 years age group 8.26% of patients responded yes(blue) ,21.10% responded no (green) and 14.68% responded maybe (yellow).**

Distribution of the population according to diabetic treatment modalities were among the biguanides, Metformin usage was found to be 56.9% among the population surveyed. The most common age group using this drug were 51-60 years of age. Among the sulphonylureas group, Glibenclamide drug usage was 25.7%, Glipizide drug usage was 33%, Glimepiride drug usage 25.7% and the most common age group using this drug were 51-60 years age. Among the insulin preparation Rapid Acting Insulin analogs (Insulin Aspart, Insulin lispro) drug usage was 17.4%, Mixed insulin usage was 45.9% and Short-acting insulin (Regular human insulin) drug usage was found to be 25.7% and the most common population age group was 51-60 years age.

Among the alpha glucosidase inhibitors acarbose drug usage was 27.5%, Voglibose drug usage was 35.8% and Miglitol drug usage was 22.9%. Most common population age group was 51-60 years old. Among the meglitinides repaglinide drug usage was found to be 26.6% and nateglinide usage was found to be 48.6% and the most common population age group using this type of drug were 51-60 years. Among the DPP4 inhibitors sitagliptin drug usage was found to be 18.3%, vildagliptin was 33% and Saxagliptin was 38.4%. The population age group using this age group were 51-60 years. Among the thiazolidinediones Rosiglitazone drug usage was 29.4% and Pioglitazone drug usage was 45.7%. The common population age group using this kind of drug were 51-60 years age group.

## DISCUSSION

Most of the people were aware of the usage of drugs like Metformin which is a biguanide used as a first line of treatment for diabetes mellitus. This is due to lesser side effects and better therapeutic action of metformin in controlling human's body blood sugar level. The Different drugs patient aware was biguanides (Metformin), sulphonylureas (glipizide, glimepiride and glibenclamide), insulin preparations rapidly acting insulin analogs (insulin aspart, insulin lispro), short-acting insulin (regular human insulin), mixed insulin. Also patients were also using alpha-glucosidase inhibitors (Voglibose, acarbose & miglitol), meglitinides (Repaglinide and nateglinide), DPP4-inhibitors (vildagliptin, Saxagliptin, Sitagliptin), thiazolidinediones (pioglitazone, Rosiglitazone). The Route of administration used commonly was through Oral route (Pills, capsule and tablet forms). But in the case of extreme hyperglycemic conditions the only preferred route of administration was Intravenous and Subcutaneous route. Older people (>50 years age group) preferred the usage of injectable agents to treat their diabetic condition.

In this study, we analyzed the usage of the drug biguanides (Metformin), 56.9% of diabetic patients were using metformin as the preliminary drug for the treatment of diabetes mellitus and 43.1% of patients were not using it.

Among the patients who use metformin, greater than 5 years of usage of metformin was seen in the age group 51-60 years as compared to 30-40 years, 41-50 years, and >60 years age group. In comparison with the previous article (7),(8) majority of diabetic patients were using metformin as the preliminary source of the drug in the treatment of diabetes mellitus. Abrons et al, in their study shows the usage of insulin preparations was found, 17.4% of diabetic patients were using rapidly acting insulin analogs (insulin aspart, insulin lispro), 45.9% were using mixed insulin and 25.7% were using short-acting insulin (regular human insulin) as the drug of choice for treatment of diabetes mellitus and 11% of patients were not using any of them. Among the patients who use mixed insulin, 5 to 10 years of usage of mixed insulin was seen, less than 1 year of usage for rapid-acting insulin analogs, more than 5 years of usage of short-acting insulin analogs was seen in the age group 51-60 years as compared to 30-40 years, 41-50 years and >60 years age group. In comparison with the findings of Abrons et al; the majority of diabetic patients were using mixed insulin as the drug choice in the treatment of severe diabetes mellitus (27).

In a study done by Fa van et al, 2000 on the usage of alpha-glucosidase inhibitors majority of diabetic patients have prescribed voglibose as the drug of choice in the treatment of diabetes mellitus. 27.5% of diabetic patients were using voglibose, 25.7% of diabetic patients were using acarbose, 22.9% patients were using miglitol and 13.8% were not using any of them. (9) Among the patients who use glucosidase inhibitors voglibose usage was between 1-5 years, acarbose usage was greater than 5 years and miglitol usage was less than 1 year in the age group 51-60 years as compared to 30-40 years, 41-50 years, and >60 years age group. (28)

In this study we found the usage of meglitinides, 26.6% of diabetic patients were using repaglinide as the preliminary drug for the treatment of diabetes mellitus, 48.6% of patients were not using nateglinide and 24.8% patients were not using any of them. Among the patients who use meglitinides, repaglinide usage was between 1-5 years and nateglinide usage was greater than 5 years in the age group 51-60 years as compared to 30-40 years, 41-50 years, and >60 years age group. In comparison with the previous article (29,30) majority of diabetic patients were using voglibose as the source of drug in the treatment of diabetes mellitus.

In a study done by Gadsby et al and Krejner et al on the usage of DPP4 inhibitors; majority of diabetic patients have prescribed saxagliptin as the drug of choice in the treatment of diabetes mellitus. (31),(32) 38.5% of diabetic patients were using saxagliptin, 33% of diabetic patients were using vildagliptin and 18.3% patients were using sitagliptin and 10.1% were not using any of them. Among the patients who use DPP4 inhibitors saxagliptin usage was between greater than 5 years, vildagliptin usage was greater than 5 years and sitagliptin usage was less than 1 year in the age group 51-60 years as compared to 30-40 years, 41-50 years, and >60 years age group.

In this study we analyzed the usage of thiazolidinediones, 45.7% of diabetic patients were using pioglitazone as the drug of choice in the treatment of diabetes mellitus, 29.4% of patients were not using rosiglitazone and 25.7% of patients were not using any of them. Among the patients who use thiazolidinediones, pioglitazone drug usage was between 1-5 years and rosiglitazone usage was less than 1 year in the age group 51-60 years as compared to 30-40 years, 41-50 years, and >60 years age group. In comparison with the previous article (33) the majority of diabetic patients were using pioglitazone drug as the choice of drug in the treatment of diabetes mellitus.

The limitation of this study is that the study was restricted to a single study niche, homogenous population, and maybe a biased response. The future scope is that advanced treatment modalities for type 2 diabetes mellitus will help in better patient treatment and decision making as to prescribe the correct drug with less adverse effects.

## CONCLUSION

The study concludes that the usage of Metformin as a first line of diabetes treatment is effective and Glipizide (sulphonylureas) is preferred as a mode of treatment for diabetes mellitus. However, the majority of diabetic patients (19.27%) preferred the usage of injectable agents as the mode of treatment for diabetes mellitus by the 51-60 years age group population.

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## Conflict Of Interest

The authors would like to declare no conflict of interest in the present study.

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