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**ORIGINAL ARTICLE**

# Prevalence of Hypoglycemia in Patients of Type 2 Diabetes Mellitus

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## ABSTRACT

**Objective:** Aim of current study is to evaluate the frequency of hypoglycemia in patients of type-2 diabetes mellitus.
**Study Design:**Cross-sectional
**Place and Duration:** King Salman Armed Forces Hospital Tabuk KSA and Muhammed Medical College & Hospital, Mirpurkhas, Sindh during from June, 2020 to Dec, 2020.
**Methods:** There were 115 patients of both genders had type-2 diabetes mellitus were presented.Patients ranged in age from 20 to 60 years old. Individuals participated in the study were asked to sign a permission form acknowledging they had read the information and understood its significance before having their demographic data collected. Frequency of hypoglycemia was recorded by Whipple's triad questionnaire based information. Symptoms of hypoglycemia were also recorded. SPSS 23.0 was used to analyze all data.
**Results:**Among 115 patients, majority of the patients 65 (56.5%) were males and 50 (43.5%) were females. Mean age of the patients was 51.6±11.54 years and had mean BMI 27.5±8.34 kg/m$^2$. There were 70 (60.9%) cases had rural residency and 45 (39.1%) patients had urban residency.Most common symptoms were dizziness, weakness and sweating among all cases. Metformin was the most common treatment used among all cases, followed by glynase and insulin. We found frequency of hypoglycemia among 50 (43.5%) in which majority of the cases were females. Among 50 cases of hypoglycemia, 11 cases had severe hypoglycemia, 20 cases had moderate and 19 cases had mild hypoglycemia.
**Conclusion:** In this research, we found that type-2 diabetic patients, most of whom were female and rural, had a high incidence of hypoglycemia. The high incidence requires primary care doctors to ask for hypoglycemia symptoms at each diabetes patient visit. It's also crucial to educate patients about hypoglycemic symptoms and the need of reporting them to alter dosage and avoid recurrence bouts.
**Keywords:**Type 2-diabetes Mellitus, Hypoglycemia, Dizziness, Glynase

## INTRODUCTION

Strict control of diabetes has been emphasised after results from the UK Prospective Diabetes Study and the DCCT. [1,2] In patients on insulin or insulin-like agents (such sulfonylurea), hypoglycemia is the most common complication of strict glycemic control. While strict glycemic control has been associated to a reduction in microvascular problems, it has also been connected to an increased risk of cardiovascular events and even mortality (ACCORD). [3] An explanation for the latter observation has been proposed as hypoglycemia and its detrimental effect on cardiovascular health through the sympathetic and parasympathetic responses. Occasionally, hypoglycemia is recognised as a risk factor for cardiovascular disease. [4] It is thus recommended that patients with long-standing diabetes or those with significant comorbidities should not be subjected to excessive glycemic control measures, especially in the elderly or those with a lengthy history of diabetes and significant comorbidities. Guidelines also emphasise drugs that are least likely to cause hypoglycemia. [5]

In hypoglycemia unawareness, there are more and more episodes of hypoglycemia. [6] Severe or persistent hypoglycemic episodes may lead to significant psychological problems and a decline in life quality. Despite the fact that the importance of hypoglycemia has been recognised, it is still an often-overlooked complication of diabetes care in modern society. [7]

Though many great antidiabetic treatments are available, it is still very difficult to achieve desired blood sugar levels. There is a need for individualised therapy and comprehensive disease management to decrease the progression of T2DM and achieve glycemic goals. [8] Maintaining rigorous glycemic control during the therapy of T2DM is essential to minimise problems, according to the DCCT study and the UKPDS[9] research. These studies are aimed at reducing HbA1c (glycated haemoglobin) to 7% while treating type 2 diabetes. Many obstacles must be overcome in order to maintain such low glycemic levels. It is quite difficult to avoid hypoglycemia. Study results like ADVANCE,[10] VADT,[11] showed an increased risk of hypoglycemia while striving to meet or exceed glycemic objectives. Cardiovascular disease and death are more common in those who have episodes of hypoglycemia like this. [12]

Diabetes mellitus has also been related with cardiovascular illnesses notably in the situations when there is a poor glycemic control. High amount of sugar is as much hazardous as is the low sugar levels producing hypoglycemia. Studies have highlighted the fact that there is a three-fold greater mortality risk with hypoglycemia than hyperglycemia[13]. Such bouts of low blood sugar/hypoglycemia are substantially related with cardiovascular events and mortality[14]. American Diabetic Association in its recommendations of avoiding hypoglycemia in diabetes patients elaborates that most of hypoglycemic episodes arises by mismanaged medication dosages and insulin usage[15].

According to this research, the incidence of hypoglycemia in the diabetic community was evaluated for a better understanding of the underlying factors that might lead to improved health outcomes and a lower death rate linked with hypoglycemia.

## MATERIAL AND METHODS

This cross-sectional study was conducted at King Salman Armed Forces Hospital Tabuk KSA and Muhammed Medical College & Hospital, Mirpurkhas, Sindh during from June, 2020 to Dec, 2020 and comprised of 115 patients. Individuals participated in the study were asked to sign a permission form acknowledging they had read the information and understood its significance before having their demographic data collected. Patients <20 years of age, had type-1 diabetes mellitus and those had gestational diabetes were not included in this study.

Patients ranged in age from 20 to 60 years old. There was a well-structured questionnaire used to capture each patient's full medical history and evaluate their hypoglycemia using data from Whipple's triad. The three factors that make up the Whipple triad are known as Whipple's criteria. The most relevant signs and symptoms in this article are those that indicate hypoglycemia after

a meal or an activity session.. After fasting or vigorous activity, low plasma-glucose levels might be a symptom. As soon as blood glucose levels are restored to normal, the symptoms will begin to subside. Patients were quizzed about whether they had had any of the following symptoms or seen any of the following biochemical test findings in the preceding 2-4 months, and their answers were documented. In addition, all of the patient's personal data was logged. SPSS-23 was used to input and evaluate the data.

## RESULTS

Among 115 patients, majority of the patients 65 (56.5%) were males and 50 (43.5%) were females.(fig 1)

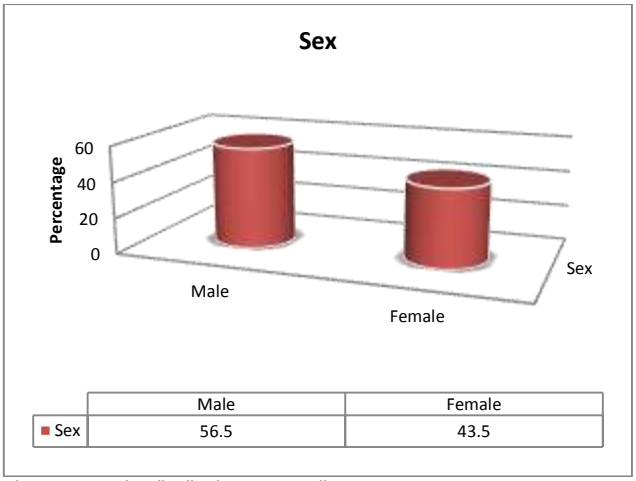


Figure-1: Gender distribution among all cases

Mean age of the patients was 51.6±11.54 years and had mean BMI 27.5±8.34 kg/m$^2$. There were 70 (60.9%) cases had rural residency and 45 (39.1%) patients had urban residency. 80 (69.6%) patients were un-educated and 35 (30.4%) were educated.(table 1)

Table-1: Characteristics details of enrolled cases

| Variables | Frequency | Percentage |
|---|---|---|
| Mean age (years) | 51.6±11.54 | |
| Mean BMI (kg/m$^2$) | 27.5±8.34 | |
| Place of living | | |
| Rural | 70 | 60.9 |
| Urban | 45 | 39.1 |
| Education Status | | |
| Yes | 80 | 69.6 |
| No | 35 | 30.4 |

Metformin was the most common treatment used among all cases, followed by glynase and insulin.Most common symptoms were dizziness, weakness and sweating among all cases.(table 2)

Table-2: Use of treatment and symptoms among all cases

| Variables | Frequency | Percentage |
|---|---|---|
| Treatment | | |
| metformin | 55 | 47.8 |
| glynase | 35 | 30.4 |
| insulin | 25 | 21.7 |
| Symptoms | | |
| dizziness | 76 | 66.1 |
| weakness | 58 | 50.4 |
| sweating | 47 | 40.9 |
| drowsiness | 40 | 34.8 |
| excess hunger | 35 | 30.4 |

We found frequency of hypoglycemia among 50 (43.5%) in which majority of the cases were females 30 and 20 patients were males.(table 3)

Table-3: Prevalence of hypoglycemia among all cases

| Variables | Frequency | Percentage |
|---|---|---|
| Hypoglycemia | | |
| Yes | 50 | 43.5 |
| No | 65 | 56.5 |
| Gender | | |
| Male | 30 | 60 |
| Female | 20 | 40 |
| Total | 50 | 100 |

Among 50 cases of hypoglycemia, 11 cases had severe hypoglycemia, 20 cases had moderate and 19 cases had mild hypoglycemia.(fig 2)

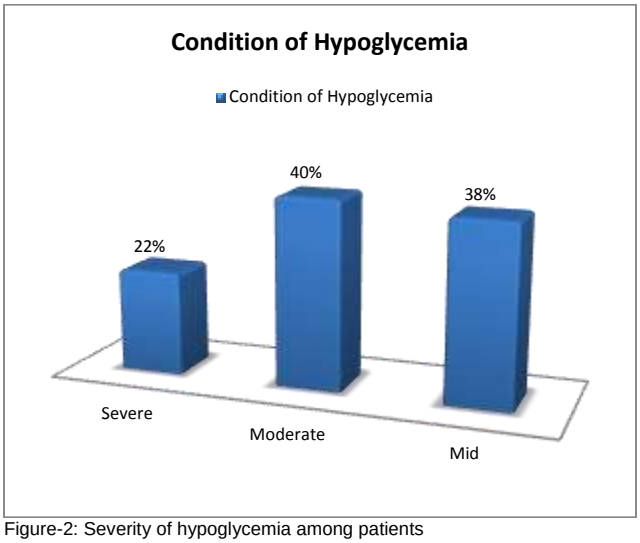


Figure-2: Severity of hypoglycemia among patients

## DISCUSSION

Several studies have shown a strong correlation between the five indicators of characteristics and the incidence of hypoglycemia in patients with type 2 diabetes mellitus who are taking insulin, such as gender, age, weight, education level, occupation, knowledge, insulin dose, and the type of insulin they use. [16]

As a serious public health issue, type 2 diabetes is also responsible for several co-morbid conditions. Diabetes mellitus is still a major problem in developing and low-income nations, despite several therapy and management options being presented.. Numerous underlying and contributory causes are causing an increase in the number of reported cases. Cardiovascular and metabolic disorders are closely linked to both hyperglycemia and hypoglycemia, and this relationship is well established. The purpose of this research is to investigate the frequency of hypoglycemia in individuals with cardiovascular disease.[17,18]

In this study 115 patients of both genders had type-2 diabetes mellitus were presented in this study.Among 115 patients, majority of the patients 65 (56.5%) were males and 50 (43.5%) were females. Mean age of the patients was 51.6±11.54 years and had mean BMI 27.5±8.34 kg/m$^2$. There were 70 (60.9%) cases had rural residency and 45 (39.1%) patients had urban residency. 80 (69.6%) patients were un-educated and 35 (30.4%) were educated. These results were comparable to the previous researches.[19,20]Metformin was the most common treatment used among all cases, followed by glynase and insulin. Most common symptoms were dizziness, weakness and sweating among all cases.[21]

There was a 63% prevalence of hypoglycemia episodes in T2DM sufferers according to Marrett et al[22]. The severity of the hypoglycemic episodes ranged from mild to severe to extremely severe. There were 78.1 percent of hypoglycemic patients who had any one hypoglycemic symptom, according to a study by Shriraam et al[23]. Some 19 percent of the individuals in the

research had severe hypoglycemia, which was documented at the tertiary care hospital. In our study frequency of hypoglycemia among 50 (43.5%) in which majority of the cases were females 30 and 20 patients were males. Previous research showed comparable results to our study.[24]There was a 16 percent prevalence of hypoglycemia in T2DM patients on oral hypoglycemic medications, compared to 30 percent in those on insulin treatment, in a retrospective interview with T2DM patients. Insulin treatment could not be linked to hypoglycemia in the rural population because relatively few persons (4.6 percent) used it.

The most prevalent cause of hypoglycemia was a missing meal, which occurred in 89.3 percent of the patients. According to another study,[26] 87% of patients indicated a missing meal as the cause of their symptoms. This demonstrates the need of educating patients on how to avoid hypoglycemia by eating at the appropriate times. In our study, among 50 cases of hypoglycemia, 11 cases had severe hypoglycemia, 20 cases had moderate and 19 cases had mild hypoglycemia. Hypoglycaemia severity was not stated when data were collected in several research (6/46, 13 percent), and hypoglycaemia criteria differed between studies (6/46, 13 percent).[28]Hypoglycaemia might have been interpreted in various ways by individuals, and some may have only reported severe occurrences. The American Diabetes Association workgroup's[27] widely adopted definition of hypoglycaemia should be utilised in all research of hypoglycaemia.

## CONCLUSION

In this research, we found that type-2 diabetic patients, most of whom were female and rural, had a high incidence of hypoglycemia. The high incidence requires primary care doctors to ask for hypoglycemia symptoms at each diabetes patient visit. It's also crucial to educate patients about hypoglycemic symptoms and the need of reporting them to alter dosage and avoid recurrence bouts.

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