

Proportion of Type 2 Diabetes Mellitus Patients with Hypoglycemia

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ABSTRACT

Objective: The purpose of this particular study is to examine the incidence of hypoglycemia in people who have diabetes type 2.

Study Design: Cross-sectional

Place and Duration: In the department of Medicine/ Endocrinology of Allied Hospital, Faisalabad for the duration from November 2021 to April 2022.

Methods: Overall, 86 patients of both sexes were presented with type-2 diabetes mellitus. Among the patients were those as young as 18 and as old as 65. Before having their demographic information collected, participants signed a consent form indicating they had read the information and understood its importance. Whipple's triad questionnaire data were used to record the occurrence of hypoglycemia. Hypoglycemia symptoms were also documented. All data were analysed with SPSS 20.0.

Results: All instances shared the most typical symptoms of dizziness, weakness, and sweating. In all cases, metformin was the most often used medication, followed by glynase and insulin. Among all, 43 (50%) patients diagnosed with hypoglycemia and majority were females. Eight of the 43 cases of hypoglycemia were extremely severe, seventeen were moderate, and eighteen were mild.

Conclusion: The majority of the patients in this study were women from rural areas who were diagnosed with type 2 diabetes. Due to its prevalence, primary care physicians should inquire about hypoglycemia in all patients with diabetes. It is also important to teach patients how to recognise the signs of hypoglycemia and how to report them so that their dosage can be adjusted and further attacks can be prevented.

Keywords: Glynase, Dizziness, Hypoglycemia, Type 2-diabetes Mellitus, Hypoglycemia

INTRODUCTION

Although diabetes is only becoming increasingly common there, China has the highest incidence rate in the world [1, 2]. Those between the ages of 15 and 49 make up the largest percentage of the Chinese population affected by diabetes, which increased from 3.7% in 1990 to 6.6% in 2016 [3]. An estimated \$2.6 trillion [4] may be lost from China's GDP if the country's 56.4 million diabetics of working age were to stop working. The psychological and social repercussions of diabetes are just as detrimental to economic development and social advancement as the physical difficulties [5, 6].

Iatrogenic causes of hypoglycemia are rather prevalent [7]. Long-term consequences of type 2 diabetes can be avoided with better blood glucose management. According to a recent meta-analysis [8], patients with type 2 diabetes who practise rigorous glycaemic management have a 17% lower risk of non-fatal myocardial infarction and a 15% lower risk of coronary heart disease events. In order to help persons with type 2 diabetes maintain tight glycaemic control, extensive treatment regimens are often implemented. There is evidence that more intensive treatment plans and better glycaemic control raise the danger of hypoglycemia[9]. However, glycaemic control and pharmaceutical therapies are growing increasingly intricate. The goal of developing these novel medicines and expanding the number of therapy combinations is to maximise glucose management without raising the risk of hypoglycemia[7,9].

Current hypoglycaemia risk factors in type 2 diabetes include treatment regimens, age, presence of co-morbidities, hypoglycaemia unawareness, dietary blunders, extreme dieting or weight loss, alcohol, number of years from diabetes diagnosis, and duration of insulin initiation.[10]

It has been recognised that hypoglycemia is a problem in the real world for people with type 2 diabetes [3, 4], but a comprehensive review and meta-analyses of the literature on the topic have not been conducted. Previous published systematic reviews on hypoglycemic episodes in type 2 diabetes have often focused on clinical studies evaluating the safety and effectiveness of a particular medication [11]. Volunteers with a higher risk of

hypoglycemia are often excluded from clinical trials, while studies with a treat-to-target design are more likely to draw highly motivated and selected participants who are then assigned study-specific treatment regimens. That means the prevalence and incidence of hypoglycemia in clinical trials may be lower than in actual practise, and the results may not be generalizable to other contexts. As such, understanding the frequency of hypoglycemia is crucial for assessing its clinical and patient-level effects. It paves the way for the allocation of means, the investigation of potential risk factors, and the development of measures to forestall hypoglycemia. Further, the occurrence and severity of hypoglycemia are frequently cited as justifications for novel therapies and clinical indicators for the selection of treatment plans for individual patients. [12]

This study examined the prevalence of hypoglycemia in the diabetic population to identify risk variables that may be modified to enhance health outcomes and reduce mortality due to this condition.

MATERIAL AND METHODS

This cross-sectional study was conducted at the department of Medicine/ Endocrinology of Allied Hospital, Faisalabad for the duration from November 2021 to April 2022 and comprised of 86 patients. Before collecting participants' demographic information, those who took part in the research were had to sign a consent form, which said that they acknowledged they had read the information and were aware of its relevance. Patients who were 18–20 years old, had type-1 diabetes mellitus, or were pregnant throughout the course of this research were not included.

Patients' ages ranged from 18 to 65 years old on average. The complete medical history of each patient was recorded on a well-structured questionnaire, and data from Whipple's triad was utilised to evaluate the patients' levels of hypoglycemia. The three components that comprise the Whipple triad are together referred to as Whipple's criterion. The signs and symptoms that suggest hypoglycemia after a meal or an exercise session are the ones that are discussed in this article that are the most relevant. Low plasma glucose levels are a possible sign of going without food for an

extended period of time or engaging in strenuous physical exercise. The symptoms will gradually improve as soon as the abnormally low blood glucose levels are treated and brought back up to normal levels. Patients were questioned to determine whether or whether they had had any of the following symptoms or had observed any of the following biochemical test findings in the 2-4 months prior, and their responses were recorded. In addition to that, each patient's private information was meticulously recorded. Input and analysis of the data were performed with SPSS-20.

RESULTS

The majority of the patients 50 were men, and there were 36 women in the total number of 86 patients. The patients had a mean age of 48.1 years, with a standard deviation of 7.30 years, and a mean body mass index of 26.2 kg/m². There were a total of 52 people who lived in rural areas, whereas 34 patients lived in urban areas. 55 of the patients had no education, whereas 31 of the patients had some education.(table 1)

Table-1: Specifics of the patients that were recruited in the study

Variables	Frequency	Percentage
Mean age (years)	48.1 ±7.30	
Mean BMI (kg/m ²)	26.2 ±4.26	
Gender		
Male	50	58.1
Female	36	41.9
Literacy		
Educated	55	63.95
Un-educated	31	36.05
Place of living		
Rural	52	60.5
Urban	34	39.5

All instances shared the most typical symptoms of dizziness, weakness, sweating, drowsiness and excess hunger. (table 2)

Table-2: The proportion of total instances in which each symptom was present

Variables	Frequency	Percentage
Symptoms		
dizziness	60	69.8
weakness	47	54.7
sweating	42	48.8
drowsiness	31	36.05
excess hunger	26	32.2

In all cases, metformin was the most often used medication, followed by glyname and insulin.(figure-1)

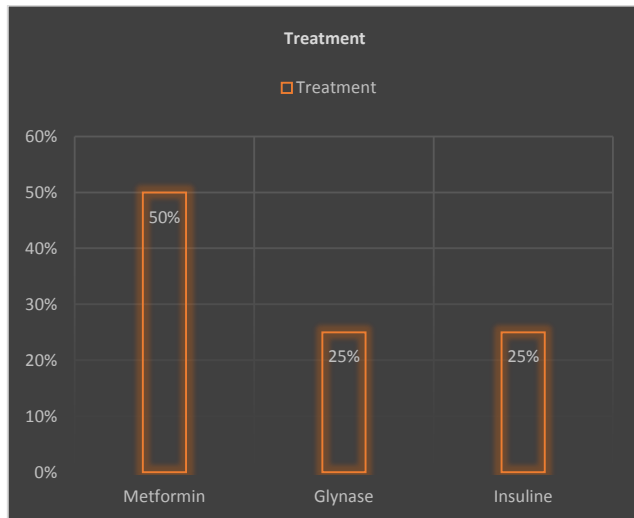


Figure-1: Treatment given to all patients

Among all, 43 (50%) patients diagnosed with hypoglycemia.(Figure 2)

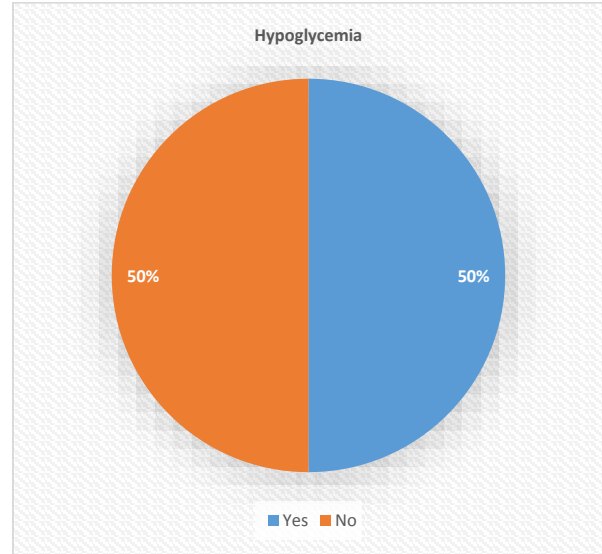


Figure 2: Hypoglycemia was seen in a significant percentage of all patients.

Eight of the 43 cases of hypoglycemia were extremely severe, seventeen were moderate, and eighteen were mild. There were 26 females among hypoglycemic patients.(table 3)

Figure-2: Severity of hypoglycemia and its association with patient gender

Variables	Frequency (43)	Percentage
Type of Hypoglycemia		
Severe	8	18.6
Moderate	17	39.5
Mild	18	41.9
Gender		
Male	26	60.5
Female	17	39.5

DISCUSSION

This cross-sectional study aimed to learn more about how often people with type 2 diabetes report experiencing hypoglycemia symptoms and how patients typically handle hypoglycemia when treating their diabetes. Ischemic heart disease, strokes, and peripheral arterial disease are all made worse by diabetes, and the condition is also a leading cause of end-stage renal impairment and lower limb amputations [13]. For chronic non-communicable illnesses, diabetes has the highest rate of incidence worldwide. For a citation, see [Citation needed] Our findings highlighted the dismal quality of life experienced by those coping with type 2 diabetes. In addition, we discovered that the prevalence of hypoglycemia among people with type 2 diabetes was 50%, that was greater than the number of patients who reported hypoglycemia signals in Thailand (30.65%) [14] but less than that in the U.S. (63%). [15].

In addition to being a significant threat to public health, type 2 diabetes is a contributing factor in the development of a number of other disorders that are classified as co-morbidities. Despite the availability of a variety of treatment and management options, diabetes remains a significant concern in countries that are still developing and have poor incomes. An expansion in the number of instances that have been documented is being driven by a complex web of underlying and additional factors. Hypoglycemia and hypoglycemia are both tightly connected to cardiovascular and metabolic problems, and this linkage between the two conditions has been extensively documented. The goal of this study is to determine the incidence of hypoglycemia in people who have cardiovascular disease.[16,17]

In this study, there were 86 individuals of both sexes who were diagnosed with type 2 diabetes mellitus. The majority of the patients 50 were men, and there were 36 women in the total number of 86 patients. The patients had a mean age of 48.1 years, with a standard deviation of 7.30 years, and a mean body mass index of 26.2 kg/m². There were a total of 52 people who lived in rural areas, whereas 34 patients lived in urban areas. 55 of the patients had no education, whereas 31 of the patients had some education. Results were comparable to the previous studies.[18,19]

In our study, all instances shared the most typical symptoms of dizziness, weakness, sweating, drowsiness and excess hunger. In all cases, metformin was the most often used medication, followed by glynase and insulin. Among all, 43 (50%) patients diagnosed with hypoglycemia. Eight of the 43 cases of hypoglycemia were extremely severe, seventeen were moderate, and eighteen were mild. There were 26 females among hypoglycemic patients. Previous studies found findings that were consistent with our investigation. [20] In a prior research, individuals with type 2 diabetes who were using oral hypoglycemic drugs had a prevalence of hypoglycemia that was 16%, but patients who were receiving insulin therapy had a prevalence of 30%. This was determined by a retrospective interview with T2DM patients. The treatment of hypoglycemia with insulin could not be connected to the rural population since only 4.6 percent of people took insulin. [21]

In 84% of patients, hypoglycemia was caused by not eating. Another research [22] found that 87% of participants attributed their symptoms to not eating enough. This highlights the need of teaching patients about hypoglycemia and when to eat to avoid it. We found that out of 50 cases of hypoglycemia, 11 were classified as having severe hypoglycemia, 20 as having moderate hypoglycemia, and 19 as having mild hypoglycemia. Six studies (13%) failed to report the severity of hypoglycemia at the time of data collection, while another 6 studies (13%) used different definitions for hypoglycemia. [23] The severity of hypoglycemia may have been overemphasised by some respondents. The generally accepted definition of hypoglycemia developed by a committee of the American Diabetes Association[24] should be used in any future studies of the condition.

Adherence to glucose-lowering regimens may be further reduced by hypoglycemia and the fear of hypoglycemia, contributing to the further aggravation of diabetes-related comorbidities. Our results were consistent with those of another study [25], which concluded that this factor has a major negative effect on quality-of-life indicators in people with diabetes. Patients with recurrent hypoglycemia have been linked to sadness and anxiety as a psychological consequence; nocturnal hypoglycemia in particular may affect one's feeling of well-being the following day due to its influence on sleep quantity and quality [26]. In the actual world, when diabetics experience hypoglycemia, they feel like they are dying and, if not treated quickly, they might suffer permanent brain damage or possibly die [27,28].

CONCLUSION

The majority of the patients in this study were women from rural areas who were diagnosed with type 2 diabetes. Due to its prevalence, primary care physicians should inquire about hypoglycemia in all patients with diabetes. It is also important to teach patients how to recognise the signs of hypoglycemia and how to report them so that their dosage can be adjusted and further attacks can be prevented.

REFERENCES

- Dagenais GR, Leong DP, Rangarajan S, Lanas F, Lopez-Jaramillo P, Gupta R, et al. Variations in common diseases, hospital admissions, and deaths in middle-aged adults in 21 countries from five continents (PURE): a prospective cohort study. *Lancet*. 2020;395(10226):785–94

- Liu M, Liu SW, Wang LJ, Bai YM, Zeng XY, Guo HB, et al. Burden of diabetes, hyperglycaemia in China from 2016: findings from the 1990 to 2016, global burden of disease study. *Diabetes Metab*. 2019;45(3):286–93.
- Hird TR, Zomer E, Owen A, Chen L, Ademi Z, Magliano DJ, et al. The impact of diabetes on productivity in China. *Diabetologia*. 2019;62(7):1195–203.
- Helgeson VS, Orchard TJ, Seltman H, Becker D, Libman I. Psychosocial predictors of diabetes risk factors and complications: an 11-year follow-up. *Health Psychol*. 2019;38(7):567–76.
- Gonder-Frederick LA, Shepard JA, Grabman JH, Ritterband LM. Psychology, technology, and diabetes management. *Am Psychol*. 2016;71(7):577–89.
- Inzucchi SE, Bergenstal RM, Buse JB, Diamant M, Ferrannini E, Nauck M, et al. Management of hyperglycaemia in type 2 diabetes: a patient-centered approach. Position statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetologia*. 2012;55(6):1577–96. PMID:22526604
- Excellence NifHaC. Type 2 diabetes: The management of type 2 diabetes. London: National Institute for Health and Care Excellence; 2009.
- Effect of intensive blood-glucose control with metformin on complications in overweight patients with type 2 diabetes (UKPDS 34). UK Prospective Diabetes Study (UKPDS) Group. *Lancet*. 1998;352(9131):854–65. PMID:9742977
- Phung OJ, Scholle JM, Talwar M, Coleman CI. Effect of noninsulin antidiabetic drugs added to metformin therapy on glycemic control, weight gain, and hypoglycemia in type 2 diabetes. *JAMA: the journal of the American Medical Association*. 2010;303(14):1410–8. PMID:20388897
- Banarier S, Cryer PE. Hypoglycemia in type 2 diabetes. *The Medical clinics of North America*. 2004;88(4):1107–16, xii-xiii. PMID:15308392
- Henderson JN, Allen KV, Deary IJ, Frier BM. Hypoglycaemia in insulin-treated Type 2 diabetes: frequency, symptoms and impaired awareness. *Diabetic medicine: a journal of the British Diabetic Association*. 2003;20(12):1016–21. PMID:14632703
- Leese GP, Wang J, Broomhall J, Kelly P, Marsden A, Morrison W, et al. Frequency of severe hypoglycemia requiring emergency treatment in type 1 and type 2 diabetes: a population-based study of health service resource use. *Diabetes Care*. 2003;26(4):1176–80. PMID:12663593
- Dong D, Lou P, Wang J, Zhang P, Sun J, Chang G, et al. Interaction of sleep quality and anxiety on quality of life in individuals with type 2 diabetes mellitus. *Health Qual Life Outcomes*. 2020;18(1):150.
- Pratpanawatr T, Satirapoj B, Ongphiphadhanakul B, Suwanwalaikorn S, Nityanant W. Impact of hypoglycemia on health-related quality of life among type 2 diabetes: a cross-sectional study in Thailand. *J Diabetes Res*. 2019;2019:5903820.
- Marrett E, Radican L, Davies MJ, Zhang Q. Assessment of severity and frequency of self-reported hypoglycemia on quality of life in patients with type 2 diabetes treated with oral antihyperglycemic agents: a survey study. *BMC Res Notes*. 2011;4:251.
- Khan MAB, Hashim MJ, King JK, Govender RD, Mustafa H, Al Kaabi B. Epidemiology of type 2 diabetes - global burden of disease and forecasted trends. *J Epidemiol Glob Health* 2020;10(1):107-1
- Roglic G. WHO Global report on diabetes: A summary. *International Journal of Noncommunicable Diseases* 2016; 1(1): 3
- Samya V, Shriram V, Jasmine A, Akila GV, Anitha Rani M, Durai V, Gayathri T, Mahadevan S. Prevalence of Hypoglycemia Among Patients With Type 2 Diabetes Mellitus in a Rural Health Center in South India. *J Prim Care Community Health*. 2019 Jan-Dec;10:2150132719880638.
- Wu, C., Ge, YL., Zhang, XY., et al. The influence of hypoglycemia on the specific quality of life in type 2 diabetes mellitus: a comparative cross-sectional study of diabetics with and without hypoglycemia in Xi'an, China. *Health Qual Life Outcomes* 19, 151 (2021).
- Silbert, R, Salcido-Montenegro, A, Rodriguez-Gutierrez, R, Katabi, A, McCoy, RG. Hypoglycemia among patients with type 2 diabetes: epidemiology, risk factors, and prevention strategies. *Curr Diab Rep*. 2018;18:53.
- hiraam, Vanishree; Mahadevan, Shriram¹; Anitharan, M.; Jagadeesh, Nalini Sivala²; Kurup, Sreelekha Bhaskara²; Vidya, T. A.³; Seshadri, Krishna G.¹. Reported hypoglycemia in Type 2 diabetes mellitus patients: Prevalence and practices-a hospital-based study. *Indian Journal of Endocrinology and Metabolism: Jan–Feb 2017 - Volume 21 - Issue 1 - p 148-153*
- The American Association of Clinical Endocrinologists . Ohio River Regional AACE 20th Annual Meeting, July 27-28, 2018; Indianapolis, IN. http://syllabus.aace.com/2018/Chapters/Ohio_River_Regional/index.html. Accessed July 19, 2019.
- Edridge CL, Dunkley AJ, Bodicoat DH, Rose TC, Gray LJ, Davies MJ, et al. (2015) Prevalence and Incidence of Hypoglycaemia in 532,542 People with Type 2 Diabetes on Oral Therapies and Insulin: A Systematic Review and Meta-Analysis of Population Based Studies. *PLoS ONE* 10(6): e0126427.
- Sequist ER, Anderson J, Childs B, Cryer P, Dagogo-Jack S, Fish L, et al. Hypoglycemia and Diabetes: A Report of a Workgroup of the American Diabetes Association and The Endocrine Society. *J Clin Endocr Metab*. 2013;98(5):1845–59.
- John A, Belinda C, Philip C, Samuel DJ, Lisa F et al. Hypoglycemia and diabetes: a report of a workgroup of the American Diabetes Association and the Endocrine Society. *J Diabetes care*. 2013; 36(5).
- Rodolfo A. Improved health-related quality of life in a phase 3 Islet transplantation trial in type 1 diabetes complicated by severe hypoglycemia. *J Diabetes Care*. 2018; 41(5).
- Martyn-Nemeth P, Quinn L, Penckofer S, Park C, Hofer V, Burke L. Fear of hypoglycemia: influence on glycemic variability and self-management behavior in young adults with type 1 diabetes. *J Diabetes Compl*. 2017;31(4):735–41.
- Yun JS, Ko SH. Avoiding or coping with severe hypoglycemia in patients with type 2 diabetes. *Korean J Intern Med*. 2015;30(1):6–16.