Clinical Audit on Hypoglycemic Symptoms in Type 2 Diabetic Patients

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SUMMARY: Hypoglycaemia is an important complication in the treatment of type 2 diabetes mellitus, because it causes recurrent physical and psycho-social morbidity, and is sometimes fatal. The main objective of the study is to clinically audit the hypoglycaemic symptoms in type 2 diabetic patients in Jinnah Hospital, Lahore. This cross sectional clinical audit was done in Jinnah Hospital, Lahore during May 2020. The data was collected with the permission of ethical committee of hospital. The data was collected from type 2 diabetic patients who were enrolled during last 6 months in the hospital. We critically analyse the hypoglycaemic symptoms of type 2 diabetic patients. The data was collected from 150 patients of Nishtar hospital, Multan for audit analysis. There were 70 males and 80 females. The age range was 40 to 70 years and the mean age was 58.95±5.67 for hypoglycaemic symptoms patients and 55.15±10.67 for without symptoms patients. It is concluded that hypoglycaemic symptoms are a common complication of diabetic treatment, and efforts should be focused especially on insulin-treated patients to prevent hypoglycaemia, including education on hypoglycaemia awareness, self-monitoring of blood glucose and dietary advice.

KEYWORDS: DM, Hypoglycemia, Outcomes, Patients.

INTRODUCTION
Hypoglycaemia is an important complication in the treatment of type 2 diabetes mellitus, because it causes recurrent physical and psycho-social morbidity, and is sometimes fatal. Achieving target glycaemic goals while avoiding hypoglycaemia is a major challenge in the management of patients with type 2 diabetes mellitus. Hypoglycaemia is the limiting factor in the glycaemic management of diabetes in the vast majority of people with diabetes¹. In healthy individuals, blood glucose concentrations are maintained within a very narrow range, despite major fluctuations in glucose entry into the body and glucose utilization in tissue metabolism. In people with diabetes mellitus, inadequate insulin secretion results in high blood glucose concentrations. The treatment of diabetes mellitus focuses on avoidance of hyperglycaemia in order to avoid its associated symptoms and to minimize the risk of vascular complications over time².

Treatments that elevate insulin concentrations in the blood independent of the ambient glucose inevitably carry risk of intermittent hypoglycaemia. Episodes of hypoglycaemia are distressing, either because of the symptom response to the falling blood glucose concentration, or because of the alteration in brain function that occurs if the plasma glucose falls too low to sustain normal neuronal function³. Hypoglycaemia, particularly when severe, is associated with considerable cost, both to the individual and to the health service.

Most of the research into hypoglycaemia has used insulin-induced hypoglycaemia as a tool and has looked at hypoglycaemia in the insulin-deficient Type 1 diabetic population⁴. The occurrence of hypoglycaemia in the treatment of Type 2 diabetes is also well recognized, but is more protean in nature, having different risk factors and clinical features according to the nature of the hypoglycaemic therapy, the extent of the insulin secretory deficit and the duration of diabetes⁵.

The global burden of type 2 diabetes (T2DM) is increasing, particularly, in economically developing countries. Epidemiological studies suggest that, without effective prevention and control programs, T2DM is likely to continue to increase globally. The United Arab Emirates (UAE), a country under developmental transition, has one of the highest prevalence of T2DM worldwide, with significant T2DM-related complications, and cost of treatment⁶.
OBJECTIVES
The main objective of the study is to clinically audit the hypoglycemic symptoms in type 2 diabetic patients in Jinnah Hospital, Lahore.

STANDARDS
This audit mainly focus on a practical approach to systematically evaluate the quality of patient care, and identify treatment gaps between current practice and target goals. Of note is the level of glycemia, blood pressure (BP), and lipid profile, which plays a significant role in reducing macro- and micro-vascular complications, and improve quality of life. Moreover, patient satisfaction may enhance treatment compliance.

METHODS
This cross sectional clinical audit was done in Jinnah Hospital, Lahore during May 2020. The data was collected with the permission of ethical committee of hospital. The data was collected from type 2 diabetic patients who were enrolled during last 6 months in the hospital. We critically analyse the hypoglycemic symptoms of type 2 diabetic patients. Socio demographic data was collected from the hospital record. For this study purpose, we analyse the blood glucose levels, HbA1c, serum lipid profile and urea nitrogen of all the patients. The most common cause of hypoglycaemia in Type 2 diabetes, resulting in significant physical and psychosocial morbidity, is iatrogenic, occurring with the use of insulin secretagogues and insulin therapy.

Data collection tool
The data was collected through systematically designed questionnaire which include all the data related to hypoglycaemia, presence of hypoglycaemic symptoms including sweatiness/shivering/giddiness/hunger, frequency, time of day, relation to meals, patient’s perception to cause, action taken, checking of glucose levels, as well as control including diet, exercise, oral medication, insulin, owning of a glucometer, and previous admissions for hypoglycaemia.

Statistical analysis
Data were coded and entered in Microsoft Excel 2017 and statistical analyses conducted using Stata version 10. Significance was accepted at $p < 0.05$ throughout.

RESULTS
The data was collected from 150 patients of Nishtar hospital, Multan for audit analysis. There were 70 males and 80 females. The age range was 40 to 70 years and the mean age was 58.95±5.67 for hypoglycaemic symptoms patients and 55.15±10.67 for without symptoms patients. There were 77 (77.1%) who checked the blood glucose concentration regularly and having symptoms of hypoglycaemia and almost 19 (38.1%) who checked the blood glucose regularly but not having the symptoms of hypoglycaemia.

Table 01: Demographic characteristics of selected patients

| Variables                  | Hypoglycaemic symptoms N=100 | Without symptoms N=50 | P-values |
|----------------------------|------------------------------|-----------------------|----------|
| Age                        | 58.95±5.67                  | 55.15±10.67           | 0.312    |
| Gender                     |                              |                       |          |
| Male                       | 30                           | 22                    | 0.061    |
| Female                     | 70                           | 28                    |          |
| Insulin treatment          | 77 (77.89%)                 | 21 (42.98%)           | 0.001    |
| Stratified According to Those on Insulin: own Glucometer |                              |                       |          |
| yes                        | 76 (75%)                    | 23 (46%)              | 0.161    |
| No                         | 24 (25%)                    | 27 (54%)              |          |
Frequency of Checking blood Sugar
At least monthly
Never to occasionally

| Frequency                  | No (22.9%) | Yes (77.1%) |
|----------------------------|------------|-------------|
| At least monthly           | 23         | 77          |
| Never to occasionally      | 31 (61.9%) | 19 (38.1%)  |

Causes of hypoglycaemic symptoms were often meal related, including interval of meals, no night snack, insulin injection without food and non-compliance to diet. Other causes include previous non-compliance but now compliant to medication, acute illness, and poor understanding of diabetes mellitus, increased medication or insulin regime (table 02).

Table 02: Characteristics of subset of diabetic patients with hypoglycaemic symptoms.

| Variables                                      | Patients | % age |
|------------------------------------------------|----------|-------|
| Has documented hypoglycaemia in the last 3 months |          |       |
| Yes                                            | 55       | 55.1% |
| No                                             | 45       | 44.9% |
| Previous admission for hypoglycaemia           |          |       |
| Yes                                            | 32       | 33.2% |
| No                                             | 68       | 66.8% |
| Time of symptoms in relation to meals:         |          |       |
| Before breakfast                               | 22       | 22%   |
| Before lunch                                  | 15       | 15.1% |
| Before dinner                                 | 27       | 26.9% |
| Midnight                                      | 32       | 32.2% |
| Others                                        | 4        | 3.8%  |
| Causes of hypoglycemic symptoms according to assessment: |       |     |
| Time interval of meals                        | 21       | 21%   |
| Acute illness                                 | 16       | 16%   |
| Insulin injection without meal                | 17       | 17.8% |
| Increase medication                           | 27       | 26.2% |
| No night meal                                 | 12       | 11.9% |
| Poor understanding of disease                 | 7        | 6.1%  |
| Frequency of symptoms:                        |          |       |
| Once in a month                               | 31       | 30.9% |
| Once in 3 months                              | 27       | 27.1% |
| Twice in 3 months                             | 21       | 21%   |
| Once a week                                   | 18       | 17.4% |
| Others                                        | 3        | 3.6%  |

CONCLUSION
It is concluded that hypoglycaemic symptoms are a common complication of diabetic treatment, and efforts should be focused especially on insulin-treated patients to prevent hypoglycaemia, including education on hypoglycaemia awareness, self-monitoring of blood glucose and dietary advice.

RECOMMENDATIONS
It is recommended that an assessment tool, glucose-lowering therapies that are associated with hyperinsulinaemia that is not glucose dependent, such as the SUs and insulin, carry a risk for hypoglycaemia that is increased in older patients, those with longer duration
of diabetes, lesser insulin reserve and other comorbidities, including renal impairment, hypothyroidism and defects of counter regulatory hormone secretion. The risk may be greater in the drive for intensified therapy and strict glycaemic control. Severe hypoglycaemia also increases with increasing duration of Type 2 diabetes, and of insulin therapy, presumably as a result of increasing deficiency of endogenous, glucose-regulated insulin secretion, with rates of self-reported severe hypoglycaemia rising from 7 to 25% in those who have been taking insulin for > 5 years.

Action plan
Despite the several limitations, hypoglycaemia has a substantial clinical impact in terms of mortality, morbidity and quality of life. The cost implications of severe episodes, both direct hospital costs and indirect costs due to inability to work, are considerable. Perhaps more important, hypoglycaemia and fear of hypoglycaemia limit the ability of current diabetes medications to achieve and sustain the degree of glycaemic control predicted to prevent the increased risk of diabetic complications.

Re-audit
In addition to regular reviews of progress a second audit cycle should be completed within 12 months of completing the first cycle.

REFERENCES
1. Maran A, Lomas J, Macdonald IA, Amiel SA. Lack of preservation of higher brain function during hypoglycaemia in patients with intensively treated insulin dependent diabetes mellitus. Diabetologia. 1995;38:1412–1418.
2. Fanelli CG, Paramore DS, Hershey T, Terkamp C, Ovalle F, Craft S, et al. Impact of nocturnal hypoglycemia on hypoglycemic cognitive dysfunction in type 1 diabetes. Diabetes. 1998;47:1920–1927.
3. Cranston IA, Lomas J, Maran A, Macdonald IA, Amiel SA. Restoration of hypoglycaemia awareness in patients with long duration insulin dependent diabetes. Lancet. 1994;344:283–287.
4. Banarer S, Cryer PE. Hypoglycaemia in type 2 diabetes. Med Clin North Am. 2004;88:1107–1116.
5. Segal SA, Paramore DS, Cryer PE. Hypoglycemia-associated autonomic failure in advanced type 2 diabetes. Diabetes. 2002;51:724–733.
6. Peacey SR, Rostami-Hodjegan A, George E, Tucker GT, Heller SR. The use of tolbutamide-induced hypoglycemia to examine the intraislet role of insulin in mediating glucagon release in normal humans. J Clin Endocrinol Metab. 1997;82:1458–1461.
7. Miller CD, Phillips LS, Ziemer DC, Gallina DL, Cook CB, El-Kebbi IM. Hypoglycemia in patients with type 2 diabetes mellitus. Arch Intern Med. 2001;161:1653–1659.
8. Ben-Ami H, Nagachandran P, Mendelson A, Edoute Y. Drug-induced hypoglycemic coma in 102 diabetic patients. Arch Intern Med. 1999;159:281–284.
9. Nattrass M, Lauritzen T. Review of prandial glucose regulation with repaglinide: a solution to the problem of hypoglycemia in the treatment of type 2 diabetes? Int J Obesity. 2000;24(Suppl. 3):S21–S31.
10. Sotiropoulos A, Sikiros EA, Tountas C, Apostolou U, Peppas TA, Pappas SI. Risk factors for severe hypoglycaemia in type 2 diabetic patients admitted to hospital in Piraeus, Greece. East Mediterr Health J. 2005;11:485–489.
11. Shorr RI, Ray WA, Daugherty JR, Griffin MR. Incidence and risk factors for serious hypoglycemia in older persons using insulin or sulfonylureas. Arch Intern Med. 1997;157:1681–1686.