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Original Research Article

Relationship between Patients with Hypoglycemia Applying to the Emergency Service and Diabetes Mellitus

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Abstract: Hypoglycemia is one of the most frequent endocrine emergencies all over the world. The aim of this study is to determine the relationship between patients with hypoglycemia admitted to the emergency department and diabetes mellitus, the frequency of hypoglycemia caused by DM and the most frequent symptoms and to identify other diagnoses which might accompany hypoglycemia. This retrospective descriptive study was conducted March 1st, 2009 and March 1st, 2011 in a Tertiary Emergency Service where 120.000 adult patients were admitted on an annual basis. The mean age of 170 patients enrolled in the study was 65.5 ± 19.9 and 109 (64.1%) of them had a previous DM diagnosis. Patients' blood glucose values were between 5-50 mg/dL and the mean blood glucose level was 39.9 ± 9.2. No statistically significant difference was obtained in terms of blood glucose between DM and non-DM patients and Type 1 DM and Type 2 DM patients. Chief complaints of the patients were confusion (n=58, 34.1%), coma (n=37, 21.7%), and neuroglycopenic symptoms such as syncope (n=34, 20%). We concluded that, hypoglycemia is one of the most frequent reasons especially for diabetic patients to apply to the emergency service it is important to diagnose and treat hypoglicemia early in the emergency department and in patients with any degree of altered mental status such as confusion, coma, and syncope, hypoglycemia must be considered.
Keywords: Hypoglycemia, endocrine emergencies, diabetes mellitus.

INTRODUCTION

Hypoglycemia is one of the most frequent endocrine emergencies all over the world. Hypoglycemia can be caused by many factors including antidiabetic medications, insulinoma, chronic renal failure, and other endocrine disorders [1].

The aim of this study is to determine the relationship between patients with hypoglycemia admitted to the emergency department (ED) and diabetes mellitus (DM), the frequency of hypoglycemia caused by DM and the most frequent symptoms and to identify other diagnoses which might accompany hypoglycemia.

MATERIAL AND METHODS

This retrospective descriptive study was conducted in a Tertiary Emergency Service where 120.000 adult patients were admitted on an annual basis. Study protocol was approved by the local ethical board.

Patients who admitted to the ED between March 1st, 2009 and March 1st, 2011 were screened retrospectively. Patients over the age of 18 and diagnosed with hypoglycemia were included in the study. The patients' demographic information, blood glucose levels at the time of admission, whether they had a known DM history, antidiabetic medication history, known other chronic diseases, admission symptoms and their conditions as of discharge were recorded according to ICD-10 code. The study data was

collected retrospectively from the hospital information system.

Statistical analysis

Frequency, ratio, mean and standard deviation values were used as the descriptive statistics of data. Data distribution was tested with Kolmogorov-Smirnov test. Mann-Whitney U test and Kruskal-Wallis tests were used in the analysis of non-parametric data and anova was used in analysis of parametric data. Chi-square test was used in the analysis of proportional data and Fischer exact test was used when chi-square conditions were not met. Statistical analysis was performed by SPSS 15.0 (SPSS Inc. Chicago, IL). P < .05 considered as statistically significant.

RESULTS

The mean age of 170 patients enrolled in the study was 65.5 ± 19.9 (Minimum: 18, Maximum: 92). 75 of the patients (44.1%) were male and 95 (55.9%) were female. 109 (64.1%) of 170 patients in the study had a previous DM diagnosis. Among the cases diagnosed with DM, 64 (58, 7%) were female and 45 (41,3%) were male. No statistically significant difference was obtained in terms of gender in those diagnosed with DM (p>0.05).

Patients' blood glucose values were between 5-50 mg/dL and the mean blood glucose level was 39.9 ± 9.2. The mean blood glucose level was 40.0 ± 10.6 mg/dL for non-DM patients; 41.0 ± 7.9 mg/dL for Type 1 DM patients; and 39.5 ± 8.5 mg/dL for Type 2 DM patients. No statistically significant difference was obtained in terms of blood glucose between DM and non-DM patients and Type 1 DM and Type 2 DM patients (p>0 ,05). (Table 1).

Table-1: Comparison of Type 1 and Type 2 DM patients and non-DM patients by means of age and blood glucose values

	Non- DM (n=??)	Type 1 DM (n=??)	Type 2 DM (n=??)	p
	Mean ± SD	Mean ± SD	Mean ± SD	
Blood glucose	40 ± 10.6	41 ± 7.9	39.5 ± 8.5	0.463
Age	68.9 ± 16.9	41.5 ± 18.8	68.9 ± 11	????

DM: Diabetes mellitus SD: Standard deviation

Assessment of treatment modalities of the patients in the study showed that only oral anti-diabetic (OAD) use was positive in 37.1% of the patients. A total of 43 (25.3%) was using only insuline and 3 (1.8%) of them were using insulin and OAD combination.

There was no statistically significant difference between three different treatment groups (OAD, insulin or insulin with OAD) for mean blood glucose values (p > 0.05) (Table 2).

Table 2: Comparison of mean blood glucose values of the patients according to medications

		Negative	Positive	
		Mean ± SD	Mean ± SD	p*
Blood glucose	Use of OAD	39.6 ± 9.9	40.4 ± 7.9	0.997
	Use of insulin	40.1 ± 9.2	39.1 ± 9.4	0.501
	Use of OAD + Insulin	39.9 ± 9.3	37 ± 2.6	0.157

*: Mann-Whitney U test, OAD: Oral antidiabetic drugs, SD: Standard Deviation

Chief complaints of the patients were confusion (n=58, 34.1%), coma (n=37, 21.7%), and neuroglycopenic symptoms such as syncope (n=34, 20%). Exhaustion, fatigue, perspiration, tachycardia and dizziness were other complaitns of the study group (Figure 1).

A total of 36 patients had non-diabetes etiologies including malignancies (n=13, 36.1%), GIS bleeding (n=2, 5.5%), sepsis (n=8, 22.2%), neurological disorders (Parkinson's, Alzheimer's, sequel SVO) (n=8, 22.2%), and liver failure (n=5, 13.8%).

All the 170 cases were monitored in emergency observation unit or hospitalized in the internal medicine clinic and received treatment. 139 patients (81.8%) were discharged with full recovery, 19 patients (11.2%) were referred to the intensive care unit, and 12 patients (7.1%) died. Prognosis of DM and non-DM groups was given in table 3.

While the discharge with full recovery rate in DM patients was significantly higher than non-DM group (p=0,001), mortality rate in non-DM patients was statistically significantly higher than DM group (p=0,021). The rate of intensive care unit admission did not show any difference between DM and non-DM groups (p=0,09).

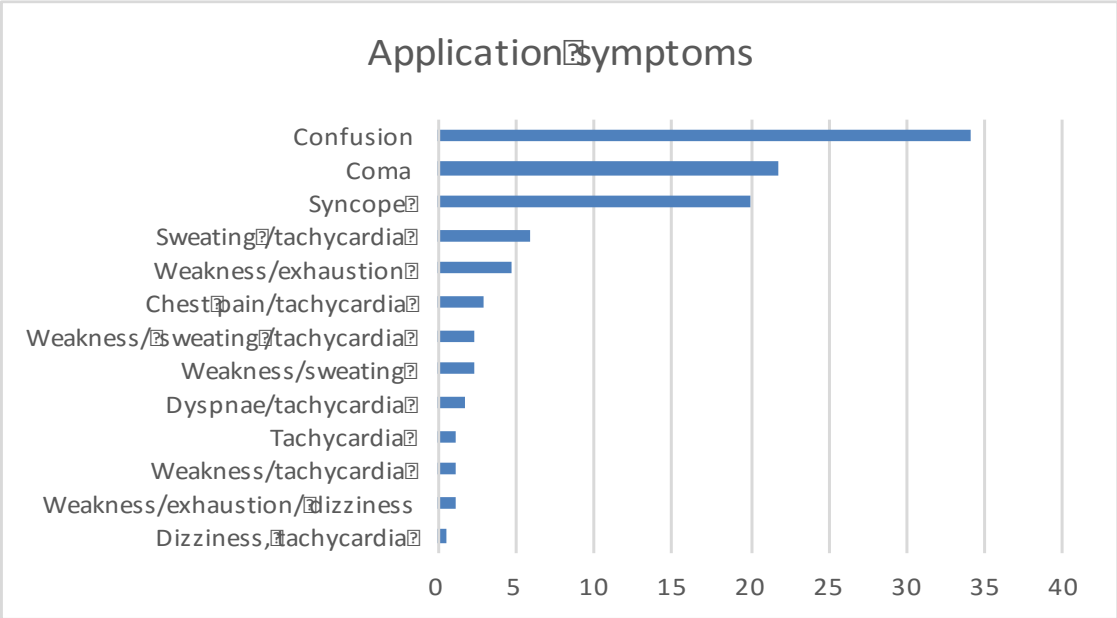

Fig-1: Symptoms observed at the time of admission to the ED with hypoglycemia

Table-3: Prognosis analysis by presence of DM diagnosis

	DM		Non-DM etiologies		p
	n	%	n	%	
Discharge with full recovery	41	67.2	98	89.9	0.000
Intensive Care	12	19.7	7	6.4	0.09
Death	8	13.1	4	3.7	0.021

DISCUSSION

Hypoglycemia is one of the most frequent and important reasons in ED among endocrine reasons all over the world. As it is associated with high morbidity and mortality, hypoglycemia should be diagnosed early and treated as soon as possible [1, 2].

Hypoglycemia symptoms, as the common point of these diseases, generally panics people and lead them to the emergency service. As it is crucial to diagnose these patients and plan their treatment, knowing the signs and symptoms of hypoglycemia is very important [1, 2]

Considering studies on hypoglycemia, the mean age of 102 hypoglycemic patients was 72 in the study of Haim Ben Ami *et al*. [3] the mean age of 126 patients was 52.58 in the study of Güven *et al*. [1] and the mean age in the study of Eren *et al*. [2] was 59.15 ± 18.62. The patients were aged between 18 and 92 years and the mean age was 65.5 ± 19.9 in our study. Hypoglycemia is frequently observed in patients aged 50 and older in the literature which means our data was compatible with the literature.

Hypoglycemia is frequent in DM patients. High doses of diabetic medication, low calorie intake, malnutrition, over exercising, prolonged fasting, over drinking, stress, age (too young or too old), and comorbid diseases such as renal and liver failure. The most recent data from the DM control and complications study (DCCT) demonstrated at least one severe hypoglycemia attack in 10-30% of Type 1 DM patients occur on annual basis [4]. It was reported that the risk of severe hypoglycemia in Type 2 DM patients is 100 times less than Type 1 DM [5]. The importance of balanced nutrition of the patient was emphasized and it was underlined that patients can be empowered by encouraging limiting alcohol intake, developing compatibility with the medication, discussing the importance of routine exercising and encouraging patients to actively involve in their treatment by clinicians [6]. Güven et al reported that hypoglycemia caused by DM treatment occurred in 54 (42%) of 126 cases, and it was reported as the most frequent hypoglycemia reason among the cases in their study [1]. Similarly, Eren et al. reported medications as the most frequent etiology of hypoglycemia in 158 (70, 2%) of 255 cases [2]. In the analysis of 170 hypoglycemic patients in our study, the most frequent reason for the hypoglycemic cases diagnosed in ED was the hypoglycemia induced by DM treatment in parallel to the literature.

Eren *et al*. [2] reported that 9 (4%) of 225 hypoglicemia cases died. They included two cases diagnosed with sepsis and multiple organ failure, two cases of terminal stage cancer, two chronic renal failure

cases, one being accompanied by congestive heart failure and hyperkalemia and one being also determined with gastrointestinal system bleeding. One case who did not have any additional disease and died 6-8 hours after developing hypoglycemia [2]. According to our results, 12 (7, 1%) of 170 hypoglycemia cases died. Three of them were diagnosed with sepsis and multiple organ failure, tree with terminal cancer, and four with DM. Two of those diagnosed with DM had chronic renal failure, one of whom was accompanied by congestive heart failure, one was diagnosed with sequel SVO and coronary artery disease and one had alcoholic liver and deep respiratory acidosis. Among these 12 patients who were died, no other cause than hypoglycemia was detected in two cases.

The rate of recovery in DM patients was significantly higher than the rate of recovery in non-DM patients in our study. The rate of intensive care unit admission and death in non-DM patients was significantly higher than DM patients. The analysis of died patients in our study demonstrates that the cause of death is the underlying disease rather than hypoglycemia.

CONCLUSION

We concluded that, hypoglycemia is one of the most frequent reasons especially for diabetic patients to apply to the emergency service it is important to diagnose and treat hypoglicemia early in the emergency department and in patients with any degree of altered mental status such as confusion, coma, and syncope, hypoglycemia must be considered. Additionally, hypoglycemia can be fatal in both DM and non-DM etiologies, and other underlying diseases may worsen the prognosis

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