STUDY OF THE RELATIONSHIP BETWEEN GLYCOSYLATED HEMOGLOBIN, HOMA IR AND SERUM GLUCOSE IN ACUTE ISCHEMIC STROKE IN THE DIABETIC PATIENT

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Abstract

Determination of serum glycosylated hemoglobin, blood glucose and insulinemia (Homa IR) can be used in the assessment and prognosis of patients with diabetic versus non-diabetic acute ischemic stroke.

Keywords: glycosylated hemoglobin, Homa IR, glucose, stroke.

Abstract

Determinarea nivelului seric al hemoglobinei glicozilate, glicemiei și insulinemiei (Homa IR) poate fi folosită în evaluarea și prognosticul pacientului cu accident vascular ischemic acut diabetic versus non diabetic.

Cuvinte cheie: hemoglobină glicozilată, Homa IR, glucoză, stroke.

Introduction

Diabetes is an independent risk factor for stroke and is associated with increased mortality. The increased risk is associated with the pathophysiological changes observed in the cerebral vessels of diabetic patients⁽¹⁾. Stroke is one of the leading causes of death worldwide, being the second leading cause of death in many countries. The frequency of ischemic stroke is 75%⁽²⁾. Some

recent studies suggest that glycosylated hemoglobin may have prognostic value in patients with acute ischemic stroke⁽³⁾.

About 40% of patients with ischemic stroke have hyperglycemia at admission and most of them have diabetes^(4,5). Insulin resistance has been shown to be associated with activation of coagulation and fibrinolysis, which are of importance in the acute ischemic phase^(6,7,8,9). Although pathophysiological aspects are still unclear,

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his condition is associated with increased mortality and morbidity in patients with acute ischemic stroke^(10,11).

Objectives

The aim of our study is to present the importance of the relationship of glycosylated hemoglobin level, HOMA IR, serum glucose level and survival in acute ischemic stroke in diabetic versus non-diabetic patient.

Material and method

This study is of a prospective, observational, longitudinal type conducted within the Oradea County Emergency Clinical Hospital between 2016-2019. In the study, 340 female and male patients aged 40-90 years were enrolled.

Patients were divided into 2 diabetic and non-diabetic groups, where we analyzed as the main criterion the glycosylated hemoglobin serum level, the HOMA IR and the serum glucose level in the diabetic versus non-diabetic patient with acute ischemic stroke. Serum glucose level, glycosylated hemoglobin and HOMA IR was evaluated at admission to our center, and the examination was performed in case of serum glucose, working method spectrophotometry, on Architect ci4100 analyzer, glycosylated

hemoglobin was performed from whole blood, method spectrophotometry working on Architect c4000 analyzer, insulinemia was performed from serum, working method chemiluminescence on Architect ci4100 analyzer.

Results

According to Kaplan Meyer analysis, diabetic patients had a lower survival rate, with a statistically significant difference $p = 0.01$, and after approximately 20 days from admission the survival ratio becomes insignificant between diabetic and non-diabetic patients and practically the survival curves are overlap (figure 1).

Glycosylated hemoglobin levels were higher in the dead patients group than in the surviving patients group, so a glycosylated hemoglobin value of 7.32 (95% CI for the mean 6) was recorded in the dead patients group 6.6867 to 7.9669) and in the group of surviving patients an average glycosylated hemoglobin value of 6.54 (95% CI for the mean 6.3109 to 6.7700), the analysis being statistically significant $p = 0.0088$ (figure 2).

We observed an association of the increased HOMA IR with a higher probability of death among patients with ischemic stroke, thus registering an arithmetic mean of the group of dead patients of 6.85 with a (95% CI for the mean 4.9474 to 8.7633), and in the group of

Figure 1. Survival in the diabetic versus non-diabetic patient in the patient with acute ischemic stroke

Figure 2. Glycosylated hemoglobin level in patients with acute ischemic stroke. Survivors versus non-survivors

Figure 3. HOMA IR in patients with acute ischemic stroke. Non-survivors vs. survivors

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Figure 4. Blood glucose level of diabetic versus non-diabetic patients with acute ischemic stroke at admission

surviving patients an arithmetic mean of 4.38 (95% CI for the mean 3.7740 to 4.9929). The analysis is statistically significant $p = 0.001$ (Figure 3). Medium glucose levels were recorded among patients with non-diabetic acute ischemic stroke with an average value of 84.56 ± 0.6171 , and among diabetic patients an average value of 276.9 ± 7.864 with (95% CI for the mean 182.1 to 202.5) this analysis being highly statistically significant $p < 0.0001$ (figure 4).

Discussions

According to our study, diabetic patients have a lower survival rate than non-diabetic

patients in the first 20 days after admission, after which the difference becomes insignificant between the 2 groups. Some studies show an increase in short-term mortality of patients with acute diabetic ischemic stroke compared to non-diabetics^(12,13,14,15).

Diabetes increases mortality in acute ischemic stroke independent of other factors such as baseline severity and ischemic heart disease⁽¹⁶⁾. Studies show a relationship between glycosylated hemoglobin level and mortality in the diabetic patient^(17,18).

There are studies that show that insulin resistance significantly increases the risk of acute ischemic stroke and leads to poor

prognosis⁽¹⁹⁾. Hyperglycemia has been shown to be a poor prognostic marker in acute ischemic stroke⁽²⁰⁾.

Conclusions

Following the analysis of the relationship between glycosylated hemoglobin, Homa IR and serum glucose level in acute ischemic stroke in the diabetic patient, it follows that all these markers can be considered as poor prognostic markers in acute ischemic stroke.

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