



## **Fund “Nauka” Project № 19033 Resume – Competition-Based Session 2019:**

**“Glycaemia in acute ischemic stroke – prognostic significance and association with metabolic and inflammatory markers”**

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The present project will investigate the prevalence of stress hyperglycemia (SH) in patients with acute ischemic stroke (AIS). The concept of SH is a current problem in everyday clinical practice. Due to the controversial evidence in the contemporary literature, the problem of the association between SH and mortality in AIS remains disputable, especially in patients without previously diagnosed diabetes mellitus (DM).

The aim of this scientific research is to look for an association between SH and adverse outcome in patients with AIS, as well as a correlation with metabolic and inflammatory markers. Participants will be selected among consecutive patients hospitalized for AIS at the Second Clinic of Neurology with ICU and Stroke Unit of St. Marina University Hospital, Varna. After signed informed consent for participation by patients, we will be given an access to mandatory laboratory tests in patients with AIS, including complete blood count, admission blood glucose (BG), lipid profile, and creatinine. Additionally, for the purposes of the study within 24 hours of admission, glycated hemoglobin (HbA1c), plasma cortisol, and serum insulin in patients who are not treated with insulin or a sulfonylurea drug, will be examined. The stroke severity at admission will be evaluated and the patients risk profile will be determined. The cohort of patients will be divided into three groups, depending on the BG level and the presence of DM according to HbA1c – with SH, with type 2 DM and with normoglycemia. On the basis of BG and HbA1c, glycemic variables will be evaluated, which are reported to have a better predictive value in terms of adverse outcome than the absolute value of BG. The incidence of fatal outcome will be compared between the groups with different glycemic parameters, and an association between stroke severity, glycemic, inflammatory and metabolic markers will be sought. Furthermore, cortisol levels will be assessed according to the severity of AIS. It is expected different mortality rate to be observed in the groups with different glycemic parameters, as well as an association between SH and stroke severity to be established.

According to our knowledge, the prevalence of SH in patients with AIS will be studied for the first time in the country, as well as its association with stroke severity, including fatal outcome. Given its prospective nature and the mandatory assessment of previous glycemic status by HbA1c testing, the study will enable the determination of the actual proportion of SH (i.e. without DM), and its relation with the outcome of AIS. The analysis will include HbA1c-based glycemic variables, which are of limited use worldwide, but are thought to have a stronger predictive value for stroke outcome, which would significantly improve the risk

assessment in these patients. For the first time in the country, plasma cortisol levels will be examined, which will enable to search for a relation between the degree of increase in BG and the severity of the acute condition.

#### **Achieved results:**

1. In this study, a similar distribution of SH in AIS was observed, which is consistent with published data.
2. Significantly higher values of HbA1c-based glycemic variables were reported in the group with SH compared to the other groups.
3. The SH group demonstrated the greatest AIS severity at admission, accompanied by the highest serum cortisol levels, with a significant difference in both indicators compared to the NG control group.
4. A significant increase in cortisol levels and glycemic variables with increasing AIS severity was reported.
5. The project team observed that both cortisol and glycemic variables, but not admission BG (admBG), positively correlated with AIS severity at admission.
6. The project team found that HbA1c-based glycemic variables are better determinants of SH compared to admBG.
7. AIS severity at discharge was also positively associated with cortisol levels, but no association was found with any of the glycemic indices.
8. In patients with a fatal outcome, significantly more severe AIS as well as higher serum cortisol levels and mean BG were observed, with no differences in admBG or glycemic variables.
9. Both worse functional outcome of AIS and fatal outcome correlated positively with patients' age, AIS severity at admission, mean BG, and also with cortisol level and some inflammatory markers.
10. Higher mean fasting BG as well as cortisol levels were associated with mortality risk in the non-DM patients in this study.
11. Both admBG and glycemic variables correlated positively with inflammatory indicators and cortisol levels.
12. The weak correlation of some of the glycemic variables with functional stroke outcome could speak of a possible prognostic value in AIS of glycemic variables, but not of admBG, although the data are not conclusive.
13. The lack of correlation of fatal outcome with admBG or glycemic variables, but the presence of one with mean BG, speaks of a greater weight of the average values of fasting BG during hospitalization in terms of stroke prognosis.

#### **Contributions:**

##### Of an original nature:

1. According to the project team's knowledge, for the first time in the country, the prevalence of SH in AIS was investigated and glycemic variables were used for its assessment.

2. According to the studied literature, for the first time, glycemic variables are compared with cortisol levels in assessing the stress response.

Of a confirmatory nature:

1. In this study, glycemic variables were claimed to provide a better estimate of SH compared to the absolute value of admBG, which is consistent with most observations worldwide.
2. It was confirmed that SH was observed in patients with more severe AIS, and a higher mortality in the SH group was observed, but a direct association of SH with fatal outcome was not established.

The project supported by the Fund “Nauka” at MU – Varna is part of the preparation of a dissertation work for the acquisition of a PhD to Dr. Zhaneta Atanasova Yaneva on topic “Glycaemia in acute ischemic stroke – prognostic significance and association with metabolic and inflammatory markers”. An original article “Cortisol levels and HbA1c-based glycemic variables for the assessment of stress response in acute stroke” is published on Scripta Scientifica Medica, 2023; Online First.