RISK ASSESSMENT OF THE DIRECT INFLUENCE OF VARIOUS DRUGS AND RELATED DISEASES AT THE LEVEL OF GLYCOSYLATED HEMOGLOBIN IN PATIENTS WITH DIABETES TYPE II

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Introduction. Diabetes mellitus type II (DMII) has assumed epidemic proportions worldwide, causing much morbidity and mortality on account of its various complications. The development of chronic vascular complications of diabetes such as retinopathy, nephropathy, and cardiovascular disease is intimately linked to the level of glycemic control attained by the individual with diabetes. Therefore, it is essential to have an index of the long-term glycemic control in diabetes patients, which in turn can be used to guide therapy and predict the likelihood of complications. Studies showed that the level of HbA1c correlated well with the glycemic control over a period of 2 to 3 months, leading to the gradual incorporation of the test into clinical practice in the 1980s. With the publication of the Diabetes Control and Complications Trial and the United Kingdom Prospective Diabetes Study both of which correlated the HbA1c levels to the development of diabetes complications, HbA1c estimation has become established as a cornerstone of diabetes management.

The efficacy of anti-diabetic medications is also assessed based on their HbA1c lowering capacity. Many algorithms for the management of diabetes utilize HbA1c as the basis for major therapeutic decisions. Recently, HbA1c has also been recommended as a tool for the diagnosis of diabetes. At the same time, a number of factors have recently been identified that can significantly affect the levels of HbA1c detected. And, accordingly, to influence the choice of diabetes treatment regimens and the evaluation of their results. These include certain conditions and diseases, as well as medications taken.

Aim. The purpose of our study was to assess the risk of direct effects of various drugs and concomitant diseases on the level of glycosylated hemoglobin in patients with DMII. The remainder of this review will focus on (non-diabetic) drugs which may falsely increase or decrease the HbA1c level.

Materials and methods. In order to achieve the targets and objectives of the study we retrospectively analyzed the medical records of 87 patients with diabetes mellitus (DMII) who were treated in departments of Saint James Hospital at Tripoli (Libya) for the first half of 2016. Among them were 53 women and 34 men aged from 42 to 72 (average 53 ± 2.14). The average duration of the disease was 6.4±1.8

years. The main criterion of selection was the character of the conducted treatment. Patients with decompensated forms of the disease were excluded from the study.

Results and discussion. In 12 patients (13.8%) were identified concomitant diseases that significantly reduced the HbA1c values. These included 9 patients with high level of triglycerides in blood and three patients with signs of liver failure. According to the information from the medical history and anamnesis, 10 of them clinically did not achieve the required level of diabetes control. Another 11 patients (12.6%) had conditions that contributed to the overestimation of HbA1c. Thus, 8 women had iron deficiency anemia, and three patients had the renal failure with a significant decrease in glomerular filtration. According to the literature, falsification of the detectable level of HbA1c can also be caused by chronic use of opiates, alcoholism, congenital hemoglobinopathies, and a number of malignant tumors. Such patients in our study were not identified.

The change in the level of the detected glycosylated hemoglobin in practice can also often be caused by the taking of certain medications. Thus, in 20 patients (23% of survey contingent) there was a decrease in the level of HbA1c due to cotrimoxazole (treatment of lower urinary tract infections). And in 7 patients due to the continuous use of aspirin in order to prevent complications of IHD and another three as a result of taking vitamin E. It should be noted that if in the first case, false-low values were obtained due to an increase in the systemic destruction of red blood cells, in the second and third cases falsification of the level of HbA1c was due to a change in the process of glycation of hemoglobin. Drugs can theoretically interfere with HbA1c levels in several ways. However, only a few instances of drug-induced variability in HbA1c have actually been reported in the literature. Among widely used drugs with such capabilities are a number of antiretroviral drugs, hydroxycarbamide, vitamin C, ribavirin and antileprotic drug dapsone.

Conclusions. HbA1c is now universally accepted as an index of long-term glycemic control and major therapeutic decisions are undertaken based on it. While the availability of newer assays has removed many of the technical problems associated with the estimation of HbA1c, several fallacies remain. In our study, about 25% of patients had high risks of falsification of the detectable level of glycosylated hemoglobin. Approximately equally they were distributed in the direction of possible overestimation of indicators, and their underestimation. It was equally caused by concomitant diseases and conditions, as well as by the administration of a number of drugs. There are a number of drugs, some of them quite commonly used, which can cause inappropriately high or low HbA1c levels for the degree of glycemia. It is essential that clinicians be aware of these interactions, and exercise caution in interpreting the HbA1c levels of such patients so that potentially serious errors can be avoided.