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VITAMIN B12 DEFICIENCY IN CLIMACTERIC WOMEN WITH DIABETES MELLITUS

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Abstract: The article highlights the role of B vitamins (including B12) in the treatment of patients with diabetes mellitus (DM) and diabetic polyneuropathy. The importance of diagnostics and therapy of cardiac autonomic neuropathy is updated, ignoring which can serve as a factor worsening the course of DM and the cause of a fatal cardiovascular outcome. Possible mechanisms of vitamin B12 deficiency development in elderly patients and patients with DM are analyzed in detail.

Keywords: B12, vitamin, diagnostics, method, treatment.

INTRODUCTION

Currently, 703 million people aged 65 years and older [1] and 422 million people under 65 years of age suffer from diabetes mellitus (DM) [2]. The most common complication of DM is diabetic polyneuropathy, a complex of clinical and subclinical syndromes characterized by diffuse or focal damage to peripheral and/or autonomic nerve fibers. Its prevalence, according to various authors, ranges from 30 to 90% [3]. The leading risk factor for the development of diabetic polyneuropathy is the duration of DM; other significant factors include age, smoking, height, obesity, triglyceride levels, and arterial hypertension [4].

MATERIALS AND METHODS

Cardiac autonomic neuropathy (CAN) is a common and often underdiagnosed complication of diabetes. It is associated with increased mortality, cardiovascular disease (CVD), and chronic kidney disease in patients with diabetes, but despite these adverse effects, it often remains unrecognized for a long time [1]. This is usually due to the fact that the disease is asymptomatic until its very late stages [2].

One of the earliest manifestations of CAN is an asymptomatic disturbance of the heart rate (HR), which later develops into resting tachycardia (90–130 bpm) [9]. Fixed pulse and unresponsiveness of the HR to respiration are associated with complete cardiac denervation and severe CAN [3].

Thus, resting HR can be used as a diagnostic and prognostic tool in patients with diabetes after excluding other causes of tachycardia [3]. In addition, a study of 11,400 patients with T2DM concluded that resting tachycardia was associated with an increased risk of death and CVD complications. However, it was unclear whether this increased risk was a direct result of a higher resting HR or simply a marker of other adverse factors that may predict a poor

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prognosis [2]. Decreased exercise tolerance is another clinical manifestation of CAN. It reduces the response of the heart and blood pressure (BP) to physical activity, and therefore HR cannot be used as an indicator of exercise intensity in patients with CAN [3].

RESULTS AND DISCUSSION

An elderly patient with diabetes during the COVID-19 pandemic requires increased attention from a physician, since the coronavirus causes the greatest damage to the elderly and patients with diabetes. Such patients are more likely to require expensive treatment in intensive care units, stay in hospital longer, and have a higher probability of dying from COVID-19 [1]. The reported mortality rates vary significantly from study to study. For example, in a French study, the mortality rate among 1317 hospitalized COVID-19 patients with diabetes (88.5% with type 2 diabetes) was 10.6% by the 7th day of hospitalization. The combination of such outcomes as death and tracheal intubation for assisted mechanical ventilation within 7 days after hospitalization reached 29% [2]. Of note, COVID-19 patients who are not elderly or have no diabetes have significantly lower case fatality rates reported worldwide. As of May 2020, the case fatality rate was highest in Europe at 9.6%, followed by North America (5.9%) and Asia (3.5%) [3]. In comparison, the case fatality rate for severe seasonal influenza is only 0.1% [4]. Established causes of higher COVID-19 complications in the elderly and people with diabetes include glycemic instability, impaired T-cell responses, and pre-existing comorbidities (e.g., obesity, cardiovascular disease, and kidney disease) [2]. Proposed causes include chronic low-grade inflammation (associated with elevated cytokines) and factors associated with viral entry (e.g., angiotensin-converting enzyme 2 expression) [4]. It has recently been suggested that nutrition is partly responsible for the large differences in COVID-19 mortality rates observed between (and even within) countries. Nutrition may affect the ability of the immune system to defend against viral infections. In a Chinese study of 182 older adults aged ≥65 years with COVID-19, the Mini Nutrition Assessment Scale (MNAS) found that 52.7% were “undernourished” and another 27.5% were “at risk of undernourishment.” DM was also found to be an independent risk factor for undernourishment (odds ratio (OR) 2.12; 95% confidence interval (CI) 1.92–3.21; p=0.006).

Currently, more than 40 studies have been registered on the role of micronutrients in COVID-19. However, most of them focus on vitamins C, D, and zinc, while the impact of vitamin B12 deficiency on the course of COVID-19 remains unclear.

Meanwhile, vitamin B12 deficiency is a fairly common condition. For example, it is associated with old age: B12 deficiency is reported by 15% of elderly people in the USA and Europe. This is associated, in particular, with cyanocobalamin malabsorption (e.g., in pernicious anemia and atrophic gastritis), poor nutrition, a vegetable-based diet, or increased loss of vitamin through the kidneys and intestines.

Worldwide, vitamin B12 deficiency is associated with diabetes. A study in primary care in the USA showed that 22% of outpatients had confirmed vitamin B12 deficiency. In another cross-sectional study of 550 patients with type 2 diabetes, conducted in four primary care centers in the Netherlands, the prevalence of vitamin B12 deficiency was 28.1%. A pilot study of 56 elderly patients with type 2 diabetes in Singapore also showed that 43% of

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participants suffered from vitamin B12 deficiency, with 75% of them having concomitant hyperhomocysteinemia.

CONCLUSION

Early diagnosis of diabetic polyneuropathy, including CAN, is critical for successful therapy, as it has been suggested that cardiovascular denervation may be reversible if diagnosed soon after its onset. The goal of treatment for diabetic polyneuropathy in general and CAN in particular is to control symptoms or slow down its progression. Current treatment options are based on a combination of non-pharmacological and pharmacological approaches, including lifestyle modification, intensive glycemic control, and treatment of major risk factors such as hyperlipidemia and hypertension.

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