Is cardiovascular risk factor prevention necessary? The influence of diabetes mellitus in the development of Alzheimer's dementia

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ABSTRACT
Alzheimer's disease (AD) is the most common cause of dementia in the elderly, causing major progressive deficits in cognitive function and memory. Currently, over 35 million people worldwide are affected by this disease. Hyperglycemia is a well-known risk factor for the development of metabolic diseases in adults, but recent studies have shown that it is also closely linked to the development of cognitive impairment and dementia. Moreover, chronic exposure to hyperglycemia can affect cognitive function and other mental diseases as well. This is worrying considering that over 176 million people are currently diagnosed with diabetes, and estimated to reach 366 million by 2030. The aim of the study is to evaluate the relationship between the presence of diabetes and other cardiovascular risk factors and the risk of developing AD.

KEYWORDS:
Diabetes, dementia, Alzheimer disease, senior patients.
INTRODUCTION
Dementia is an “umbrella” term that encompasses many neurodegenerative disorders, including Alzheimer's disease (AD), which has an insidious onset and a slow progression. The prevalence is increasing, the global costs estimated by 2015 were US $ 818 billion annually, and they will expand to 2 trillion by 2030. Clinical diagnosis can be often difficult, and this is the reason why there were designed new methods, which were introduced in the last decade in order to facilitate the early diagnosis and, more importantly, prevention of AD (1). The application of these methods is constantly increasing, partly due to the high degree of awareness of cognitive symptoms and the relevance of early detection and diagnosis, especially when more effective drugs are available to treat this pathology. Currently, only symptomatic treatment can be prescribed, and the focus should be on potential prophylactic strategies (2).

Obesity is a major risk factor for AD, because it induces adipokine breakdown, which consists of the release of pro-inflammatory adipokines and the decrease of anti-inflammatory adipokines among other processes. On the other hand, obesity is one of the most important modifiable risk factors for the prevention of Type 2 Diabetes. Moreover, it has been shown that being overweight is associated with an increased prevalence of high blood pressure, dyslipidemia and is associated with an increased risk of mortality, especially due to cardiovascular diseases (3, 4). This is due to changes in lifestyle, for example, low levels of physical activity, an unbalanced diet and excessive nutrition, leading to processes of inflammatory and oxidative stress, thus altering the metabolic pathways required for homeostasis (5, 6).

Strategies for the prevention of AD through non-pharmacological treatments are associated with lifestyle interventions such as exercise, mental challenges and socialization, as well as caloric restriction and a healthy diet (3, 6) (see fig 1).

Fig.1 Non-pharmacological treatments strategies for the prevention of AD

The beneficial effects of physical activity are well known; however, beyond the general recommendations available for health promotion, regarding the type, frequency, intensity and duration of physical activity that could protect against AD, specific practical recommendations are not yet well known. However, at present, physical activities that have additional components of social and cognitive stimulation are considered to be the most effective. (7, 8, 9)

AD is a very important health problem that requires screening to monitor cardiovascular risk factors, so that prevention strategies can be implemented in order to minimize the risk of its development (10).
In the proposed study, our objectives were to evaluate cardiovascular risk factors among the adult population and the risk of developing Alzheimer's Dementia after 20 years, and the influence of pharmacological and nonpharmacological treatment of cardiovascular risk factors has over the risk of developing AD.

**METHODOLOGY**

We present partial results of a prospective study conducted between January-August 2019. The study group consisted of 40 patients, aged between 40-65 years, hospitalized in the Internal Medicine Ambulatory and the Hospital Geriatrics Clinic "Dr. C. I. Parhon ”, Iasi. The realized balance included the following:

- Biological exploration
- Evaluation of cardiovascular risk factors
- Comprehensive geriatric evaluation
- Assessment of the risk of developing Alzheimer's dementia - CAIDE score (tab.I)

All subjects signed an informed consent questionnaire and had the opportunity to withdraw at any time during the study period.

**Tabel I CAIDE score**

| CAIDE SCORE: PROBABILITY OF DEVELOPING DEMENTIA IN 20 YEARS |
|-------------------------------------------------------------|
| RISK FACTORS | POINTS |
|----------------|--------|
| <47 | 0 |
| 47-53 | 3 |
| >53 | 4 |
| >10 years | 0 |
| 7-9 years | 2 |
| <7 | 3 |
| Female | 0 |
| Male | 1 |
| <140mmHg | 0 |
| >140mmHg | 2 |
| <30Kg/m² | 0 |
| >30Kg/m² | 2 |
| <6,5mmol/l | 0 |
| >6,5mmol/l | 2 |
| Yes | 0 |
| No | 1 |

The incidence of Type 2 Diabetes in the group of patients studied showed that the percentage in women is 20% higher than in men (Fig. 3)
The BMI analysis in the study showed that out of the total number of patients, the highest weight is of overweight patients (38.9%) and those with grade I obesity (27.8%) (Fig. 4):

Using the CAIDE score, we identified (fig. 6):
- Regarding the average risk of developing AD, it can be seen that women are the ones with the highest incidence.
- A higher percentage of male patients in the study group have an increased risk of developing Alzheimer's dementia compared to female patients.
DISCUSSIONS
AD is a multifactorial disease and the combination of two or more non-pharmacological treatments for prevention is extremely important, of course in combination with drug therapy (3, 6).

Socialization is also an important component for human mental and physical development, and its lack induces loneliness by increasing the risk of: depression, obesity, diabetes, hypertension, and AD (4, 6).

The risk of developing AD should be considered from early ages, to avoid risk factors, and for the elderly, it is important to improve treatments by adopting a healthier lifestyle and dietary changes; in order to strengthen prevention (10).

There is a lot of obesity type diabetes, that is closely related to the factors that promote the evolution towards AD (lack of physical activity, stress, lack of socialization-which are the main preventive elements in AD).

Our study demonstrates once again that there is a close relationship between the presence of cardiovascular risk factors and the increased risk of developing AD. Also, the lack of physical activity and obesity are closely linked to the presence of DM and the increased risk of developing AD.

CONCLUSIONS
Given that there is currently no known remedy for AD, further experimental research exploring preventive strategies is clearly needed. AD research needs to be further developed to propose new molecules for therapy; but what is most important for the purpose of developing prevention and screening measures.

Evidence suggests that diet and activity changes that lead to weight loss are especially effective in reducing diabetes risk. Preventing diabetes or managing it successfully helps avoiding cardiovascular complications and decreasing the risk of developing mild cognitive impairment and AD.

The multidisciplinary approach of AD for dementia prevention also seems more promising in comparison with the traditional, unidisciplinary approach.

ACKNOWLEDGEMENTS AND DISCLOSURES
The authors have no potential conflict of interests to disclose.

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Submission: 2 aug 2020
Acceptance: 4 sep 2020