ABSTRACT

White Matter Disease is increasingly being recognized as an important cause of cognitive decline and dementia. Various investigations have linked chronic disease-related conditions to the development of white matter lesions, which appear as white matter hyperintensities on T2-weighted magnetic resonance imaging (MRI) scans of the brain. Thus, it is postulated that the metabolic, inflammatory, and microvascular changes accompanying certain chronic diseases, such as diabetes, obesity, hyperlipidemia, and hypertension, induce hyperintensities in the brain, which are markers of small vessel disease and blood-brain barrier disturbances. Specifically, we focus on the effects of high-intensity ultrasound in the brain, obesity-induced oxidative stress, and amyloid beta peptide levels, both of which are hallmark mouse models of diabetes. Increased tau phosphorylation and amyloid beta peptide activation of cyclooxygenase-2 (COX-2) inhibitors and anti-inflammatory drugs may be used to reduce the risk of Alzheimer’s disease. However, other studies suggest that COX-2 inhibitors worsen diabetes. Alzheimer’s disease, diabetes, and cognitive decline are complex conditions, and further investigation is needed to elucidate the mechanisms and therapeutic targets for preventing and treating these chronic disease-related conditions.

INTRODUCTION

• Alzheimer’s disease is the most common cause of dementia and has been linked to the leading cause of death in the United States.
• Lower intake of nutrient-dense foods and higher intake of processed “Fast Foods” have been found to be independently associated with a higher risk of cognitive decline.
• Obese patients with diabetes are at greater risk of developing Alzheimer’s disease.
• Diffuse white matter disease is a complex condition, and further investigation is needed to elucidate the mechanisms and therapeutic targets for preventing and treating these chronic disease-related conditions.

DIFFuse White Matter Disease is characterized by white matter hyperintensities in the brain, which are markers of small vessel disease and blood-brain barrier disturbances.

METHODS

We systematically searched PubMed databases for both preclinical and clinical studies.

RESULTS

• Various clinical studies have linked chronic conditions, such as diabetes, obesity, hyperlipidemia, and hypertension, with white matter hyperintensities in the brain. These chronic conditions may be associated with increased oxidative stress, inflammation, and amyloid beta peptide levels, both of which are hallmark mouse models of diabetes. Increased tau phosphorylation and amyloid beta peptide activation of cyclooxygenase-2 (COX-2) inhibitors and anti-inflammatory drugs may be used to reduce the risk of Alzheimer’s disease.
• Alzheimer’s disease, diabetes, and cognitive decline are complex conditions, and further investigation is needed to elucidate the mechanisms and therapeutic targets for preventing and treating these chronic disease-related conditions.

CONCLUSIONS AND CLINICAL IMPLICATIONS

• Consumption of the Western diet contributes to the development of chronic diseases, such as diabetes, obesity, hyperlipidemia, and hypertension. In turn, these chronic conditions lead to inflammation, and microvascular changes that affect many parts of the body, including the brain. The Western diet is also suspected to directly contribute to cognitive impairment as a result of increased blood lipids, sugars, and sodium.
• Our review shows that metabolic, inflammatory, and microvascular changes accompanying chronic disease-related diseases play a significant role in promoting cognitive decline. However, further investigation is needed to elucidate the mechanisms and therapeutic targets for preventing and treating these chronic disease-related conditions.

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See reference sheet.

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