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EFFECTS OF ALLOXAN MONOHYDRATE-INDUCED COGNITIVE DECLINE ASSOCIATED WITH DIABETES IN WISTAR RATS

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INTRODUCTION & AIM

Diabetes is a disease characterised by a genetic predisposition and acquired metabolic disorders that lead to a progressive reduction in insulin activity and secretion. Environmental factors such as changes in quality of life, overeating and a sedentary lifestyle can cause or accelerate these abnormalities.

According to the WHO, the global prevalence of diabetes in adults aged 18 and over rose from 4.7% in 1980 to 8.5% in 2014. A study conducted in the Congo in 2004 found a prevalence of 7.6% in men aged 25 to 64. It goes hand in hand with obesity, ageing and sedentary behaviour. International epidemiological data on the prevalence of diabetes show major differences between developed and developing countries. The number of people with diabetes will rise from 366 to 552 million by 2030.

Hyperglycaemia progresses unnoticed for years before a diagnosis is made. Its prevalence is not constantly updated. The long-term effects of diabetes, with its micro and macro-angiopathy complications, are debilitating diseases that require comprehensive patient management. Today, numerous epidemiological, clinical and experimental arguments have accumulated to support the harmful effects of low-intensity inflammation in adipose tissue on the development of diabetes and numerous cognitive disorders.

However, much recent research has highlighted that chronic diabetes in untreated patients leads to the formation of interneuronal amyloid plaques in the brain, resulting in neuropathological manifestations such as Alzheimer's disease. Insulin resistance in type 2 diabetes has also been shown to cause cognitive impairment. Despite these advances, effective treatment of chronic diabetes does not completely eliminate cognitive impairment. The aim of our study was to assess the cognitive decline associated with alloxan monohydrate-induced diabetes in Wistar rats.

METHOD

This study involved 24 Wistar rats weighing between 150 and 300 g. They were divided into three groups:

(1) normal rats ;
(2) untreated diabetic rats ;
(3) diabetic rats treated with D-erythrodihydrosphingosine.

Injection of a single dose of 150 mg/kg body weight of alloxan monohydrate subcutaneously into fasted rats overnight resulted in diabetes. The rats were given glucose and food overnight to prevent hypoglycaemia. Behavioural experiments were carried out using object recognition and radial arm maze tests.

RESULTS & DISCUSSION

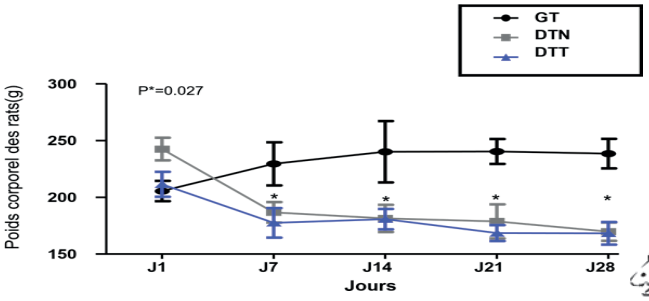

Figure 1. Body weight of the three different groups of Wistar rats

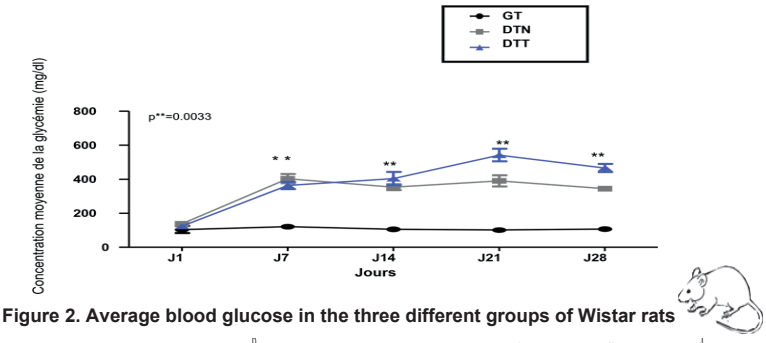

Figure 2. Average blood glucose in the three different groups of Wistar rats

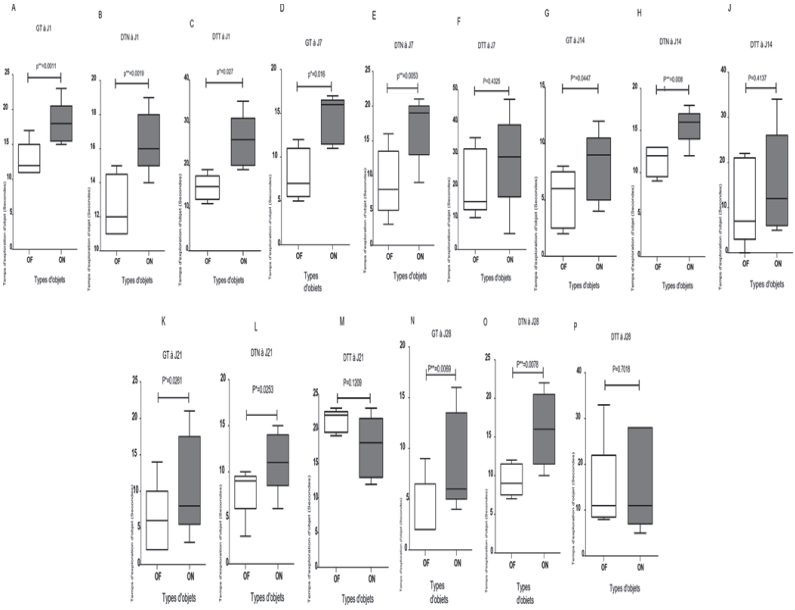

Figure 3. Object recognition test on days 1, 7, 14, 21 and 28 in Wistar rats from different groups (GT, DTN and DTT)

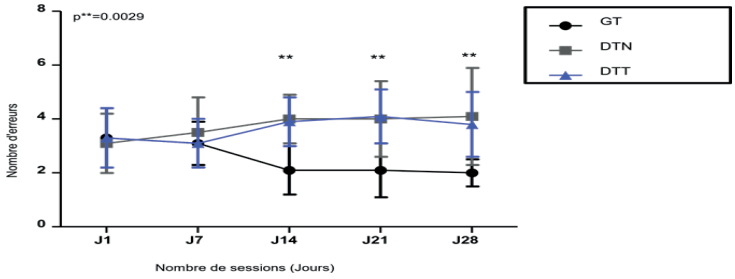

Figure 4. Spatial learning

CONCLUSION

Working memory is impaired and spatial learning is difficult. Nevertheless, our results would help to understand the link between cognitive decline and hyperglycaemia and highlight the importance of comprehensive management of diabetic patients with neurocognitive problems.

REFERENCE

Livingston Raja N., Sundaranathavalli S., JeyaAnanthi J., Nirmaladevi J., Kumarappan C. Antihyperglycaemic activity of aqueous extract of vincarosealinn in alloxan induced diabetic rats. Pharmacologyonline. 2008 ;3: 354-362.