ABSTRACT

Introduction:

Substantial body of evidence has shown cognitive and behavioral deficits in children with T1DM of early onset. Developing brain is more vulnerable to the hazardous effects of dysmetabolism in T1DM. The most consistently related factors linked to cognitive decline are the age of onset and chronicity of diabetes. Currently, the only feasible treatment available for T1DM is insulin, which has its own limitations. However, the efficacy of combined treatment on diabetic encephalopathy in young has not been studied. Hence, the present study was carried out to evaluate the efficacy of combined treatment with Salacia reticulata W., Clitoria ternatea L. and enriched environment on cognitive and behavioral changes in young diabetic rats.

Objective:

Primary: To study the effects of different treatments on cognitive and behavioral changes in STZ induced young diabetic rats having severe hyperglycemia (FBS ≥ 200 mg/dl).

Secondary: To study the effects of 10 and 20 days duration of diabetes on cognitive and behavioral changes in STZ induced young diabetic rats having severe hyperglycemia (FBS ≥ 200 mg/dl).

Methods:

Diabetes was induced in young, 25 days old Wistar strain albino rats, by single intra-peritoneal injection of streptozotocin (50 mg/kg BW). Fasting blood sugar (FBS) level and body weight (BW) were measured regularly. Rats were divided in to eleven groups (n = 6 in each) as, NC-10, DC-10, NC-20, DC-20, SR, CT, EE, IN, SR+CT-01, SR+CT-20, SR+CT+EE. Initially, effects of duration of 10 and 20 days on cognitive and behavioral changes were studied. Later, alcoholic extracts of SR and
CT was administered at dose of 100 mg/kg BW for 30 days, from the day one of confirmation of diabetes. Then, rats were tested for cognitive changes in elevated plus maze, passive avoidance and Morris water maze for over 10 days. Finally, after sacrificing the animals, gross brain weight was measured.

Results:

The results are expressed as Mean ± SE. Differences were considered significant at $P \leq 0.05$. Animals in DC-20 group showed significantly reduced transfer latencies and spent lesser time on open arm (OA) compared with DC-10 and NC-20 group of animals. The animals treated with combination of SR+CT and SR+CT+EE showed significantly decreased FBS levels, increased transfer latencies and they spent more time on OA compared with animals treated with single therapy. The treatment helped diabetic rats to achieve almost normal cognitive performances in almost all the above mentioned tests.

Conclusion:

The increasing duration of diabetes increases cognitive and behavioral deficits in young diabetic animals. The combined treatment with SR+CT and SR+CT+EE found to be beneficial in recovering cognitive and behavioral deficits in diabetic animals. However, treatment was effective only when started from day one of confirmation of diabetes. The beneficial effect in animals which received combined treatment was comparable to that of any other single treatment. Current study highlights the importance of early diagnosis of T1DM to prevent the deleterious effects of chronic diabetes on developing brain. Cognitive enhancers that are developed to treat cognitive disorders in diabetes may prove useful in other conditions, including neurological disorders in children or dementia in old age or for cognition enhancement in healthy younger population.