

**EKSPRESI CASPASE 3 SEL BETA PANKREAS MENCIT (*Mus musculus*) DENGAN  
*DIABETES MELLITUS* PADA PEMBERIAN VANADIL SULFAT**

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**ABSTRACT**

The present study was designed to investigate the influence of vanadyl sulphate on the caspase 3 expression, which played a vital role in the execution of pancreatic  $\beta$ -cell apoptosis in streptozotocin induced diabetic mice. 25 mice were divided into five groups i.e placebo, positive and treatment groups with three doses of vanadyl sulphate (5, 30 and 100 mg/kg BW). Diabetic mice model was induced with twice intraperitoneally administration of streptozotocin. The first injection was a single dose of streptozotocin 100 mg/kg BW on the 1st day and the second injection was single dose 50 mg/kg BW on the 14th. Diabetes occurred on day 21 after streptozotocin injection and glucose level was significantly raised from  $111.00 \pm 6.79$  mg/dL to  $202.93 \pm 12.99$  mg/dL ( $F(1,18) = 14.429$ ;  $p < 0.05$ ). Administration of vanadyl sulphate in three doses (5, 30 and 100 mg/kg BW) was given on the 21st to 28th. Blood glucose concentration of diabetic mice given vanadyl sulphate: dose 5 mg/kg, reduced from  $163.00 \pm 3.06$  mg/dl to  $102.67 \pm 19.03$  mg/dl ( $p < 0.05$ ); dose 30 mg/kg, reduced from  $219.75 \pm 22.02$  mg/dl to  $111.25 \pm 19.69$  mg/dl ( $p < 0.05$ ); dose 100 mg/kg, reduced from  $242.67 \pm 24.55$  mg/dl to  $62.67 \pm 17.65$  mg/dl ( $p < 0.05$ ).

The pancreas tissues were taken on the 28th of experimental day and stained with *haematoxylin eosin* and *aldehyde fuchsin* for morphological quantitative analysis and immunohistochemical examination to observe the expression of caspase 3 in pancreatic  $\beta$ -cells apoptosis. In pancreatic islets of the diabetic group, damage islet, decline islet size, and degenerative pancreas  $\beta$  cells were observed in comparison to the diabetic group. On the other hand, pancreatic islets of the diabetic group given vanadyl sulfate showed a higher number of the prominent  $\beta$  cells, intact islet, increased islet size in comparison to the diabetic group. Administration of three different doses of vanadyl sulfate were all significantly enhance islet Langerhans' diameter and the number of  $\beta$  cells on single islet, respectively ( $F(4,49) = 96.273$ ,  $p < 0.05$ ) and ( $F(4,49) = 92.116$ ,  $p < 0.05$ ). In diabetic mice, the number of  $\beta$  cells on single islet was  $22.80 \pm 3.05$  and islet Langerhans' diameter was  $23.70 \pm 4.32$   $\mu\text{m}$ . In diabetic mice given vanadyl sulfate, the number of  $\beta$  cells and islet Langerhans' diameter were increased in comparison to the diabetic group. Respectively, the number of  $\beta$  cells on single islet and islet Langerhans' diameter of diabetic mice given vanadyl sulfate at 5 mg/kg, was  $60.80 \pm 6.63$  ( $p < 0.05$ ) and  $42.39 \pm 6.26$   $\mu\text{m}$  ( $p < 0.05$ ); 30 mg/kg BB, was  $100.10 \pm 12.71$  ( $p < 0.05$ ) and  $67.60 \pm 10.25$   $\mu\text{m}$  ( $p < 0.05$ ); 100 mg/kg BB, was  $110.20 \pm 16.54$  ( $p < 0.05$ ) and  $95.15 \pm 12.61$   $\mu\text{m}$  ( $p < 0.05$ ). Immunohistochemical approach, it showed that vanadyl sulphate can suppress the activity of caspase 3 and reduced the number of pancreatic  $\beta$ -cells apoptosis.

According to the histochemical and immunohistochemical result as well, it was concluded that vanadyl sulfate could be decreased blood glucose concentration and apoptotic  $\beta$  cell in diabetes state.

**Keyword(s)** : vanadyl sulphate, streptozotocin, diabetes mellitus, islet Langerhans, pancreatic  $\beta$ -cell, apoptosis, caspase 3