كلية البنات للآداب والعلوم والتربية
قسم علم الحيوان

الدور المحتمل لكل من الخلايا الجذعية الميزنشيمية و الميلاتونين في علاج مرض السكري المستحث بواسطة ستريبتوزوتوسين في ذكور الجرذان.

رساله مقدمة للحصول على درجة دكتوراه الفلسفه فى العلوم (علم الحيوان)

من الطالبه/

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Faculty of women for Arts
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Department of Zoology

The Possible Role of Mesenchymal Stem Cells and Melatonin in the Treatment of Diabetes Induced by Streptozotocin in Male Albino Rats.

A thesis submitted for the degree of Ph.D. of Science in Zoology

By

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الدراسات العليا

ختم الإجازة

موافقة مجلس الكلية

/ / 20

أجيزت الرسالة بتاريخ : / / 20

موافقة مجلس الجامعة

/ / 20

كلية البنات للآداب والعلوم والتربية
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ABSTRACT

Abstract

The present study was established to investigate the role of bone marrow mesenchymal stem cells (MSCs) and melatonin (MT), alone or in combination with each other for improvement of beta cell functions in STZ-induced diabetic rat model. Also, to evaluate the role of melatonin in increasing the efficacy of MSCs. Fifty two male albino rats (130-150g) were divided into six groups. Control: received phosphate buffer saline PBS; Melatonin group received melatonin (10 mg/kg b.wt./ day for 2 months by oral intubation); Diabetic untreated group; Diabetic group treated with melatonin; Diabetic group treated with mesenchymal stem cells (MSCs) (A single intravenous injection of 3×10^6 cell in PBS)and Diabetic group treated with both stem cells and melatonin. Diabetes was induced by a single i.p. injection of 45mg/kg b.wt. of streptozotocin.

The results showed that treatment of diabetic rats with either MSCs alone or in combination with melatonin resulted in an increase in body weight and pancreas weight. The biochemical analysis showed significant improvement in glucose, insulin, total antioxidant and malondialdehyde level in diabetic rats treated with either MSCs alone or in combination with melatonin. On the other hand, the results of imumuno-histochemical analysis showed that MSCs and/or melatonin treatment reduced the rate of inflammation and

apoptosis of the islet cells of pancreas as well as increased the rate of pancreatic cell division. Such results were indicated by a significant improvement in the level of TNF-α, IL-10, PCNA and caspase-3 to levels very close to the control. The microscopic examination of Langerhans islets showed that treatment with MSCs either alone or in combination with melatonin resulted in an improvement in the tissue of the pancreas or reduced number of damaged beta cells.

It can be concluded that stem cell therapy has a significant role in restoring the structural and functional efficiency of beta cells in the pancreas. The results also showed that co- treatment of stem cells and melatonin was more effective than stem cell alone. Such result may be due to the role of melatonin as an antioxidant in increasing the efficiency and vitality of stem cells.

LIST OF CONTENTS

LIST OF TABLES

LIST OF FIGURES