Successful management of type 2 diabetes using mesenchymal stem cell therapy and integrative approaches: A case report

Dr. Dasheni Puvanaendran¹, Dr. Cecillian Veronica², Mr. Bhushan Nikam³, Mr. Vikas Singh⁴

¹MBBS, ²MD,FINEM, ³BPharm, ⁴BPharm

¹Department of Functional Medicine,

¹SOL integrative wellness centre, kuala lumpur, Malaysia

Abstract:

Background: Malaysia has the highest rate of diabetes in Western Pacific region and one of the highest in the world and costing around 600 million US dollars per year. The prevalence of diabetes raised from 11.2% in 2011 to 18.3% in 2019, with a 68.3% increase. According to a national survey report, in Malaysia in 2019, 3.6 million adults (18 and above years) had diabetes, 49% (3.7 million) cases were undiagnosed. Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and relative insulin deficiency. Insulin, produced by the pancreas, is a hormone that helps regulate blood sugar (glucose) levels by facilitating the uptake of glucose into cells for energy production or storage. In individuals with Type 2 diabetes, cells become resistant to the action of insulin, leading to elevated blood sugar levels (hyperglycemia).

Case Presentation:

This case reports describe successful management of Type 2 diabetes in a 57-year-old female with a history of hyperlipidemia, through mesenchymal stem cell therapy from Wharton's jelly of the umbilical cord, combined with berberine and cinnamon supplements.

The mesenchymal stem cells sourced from Wharton’s jelly of umbilical cord selected for their regenerative properties and potential to modulate the immune response associated with diabetes. These cells were carefully administered to target specific areas of concern related to Patient's diabetic condition. The addition of berberine and cinnamon supplements was intended to provide adjunctive support, with berberine known for its potential to enhance insulin sensitivity and cinnamon for its purported benefits in managing blood sugar levels.

After a four-month follow-up, Patient's HbA1c levels significantly decreased indicating successful management of diabetes. Additionally, liver function tests showed overall improvement.

Conclusion:

The integration of Mesenchymal stem cell therapy with personalized supplements and lifestyle modifications resulted in notable improvements in glycemic control and lipid profiles in this patient with T2DM and hyperlipidemia. These findings underscore the potential of holistic and individualized approaches in managing complex metabolic conditions, emphasizing the importance of ongoing follow-up and comprehensive care.

Keywords: Type 2 Diabetes Mellitus, Mesenchymal Stem Cell Therapy, Wharton's Jelly, Umbilical Cord Stem Cells, Berberine, Cinnamon Supplements, Diabetes Management.

Introduction

Malaysia has the highest rate of diabetes in Western Pacific region and one of the highest in the world and costing around 600 million US dollars per year [1,2]. The prevalence of diabetes raised from 11.2% in 2011 to 18.3% in 2019, with a 68.3% increase [3]. According to a national survey report, in Malaysia in 2019, 3.6 million adults (18 and above years) had diabetes, 49% (3.7 million) cases were undiagnosed [14]. Type 2 diabetes (T2D), formerly known as adult-onset diabetes, is a form of diabetes mellitus that is characterized
by high blood sugar, insulin resistance, and relative lack of insulin \[^4\] Insulin, produced by the pancreas \[^7\], is a hormone that helps regulate blood sugar (glucose) levels by facilitating the uptake of glucose into cells for energy production or storage. Type 2 diabetes is due to insufficient insulin production from beta cells in the setting of insulin resistance \[^8\]. Insulin resistance, which is the inability of cells to respond adequately to normal levels of insulin, occurs primarily within the muscles, liver, and fat tissue \[^9\]. T2DM is characterized by insulin resistance and hyperglycemia, often accompanied by symptoms such as increased thirst, frequent urination, fatigue, and blurred vision. \[^5\]

This case report focuses on a 57-year-old Malaysian woman with T2DM and hyperlipidemia who underwent innovative therapeutic interventions, including stem cell therapy and integrative medicine. Stem cell therapy, specifically utilizing mesenchymal stem cells derived from Wharton's jelly of the umbilical cord \[^6\], was combined with the use of berberine and cinnamon supplements.

The aim was to assess the impact of this holistic approach on glycemic control and lipid profiles in a real-world clinical setting. The patient's response to these interventions provides valuable insights into the potential benefits of personalized and integrative strategies for managing complex metabolic conditions like T2DM.

**Case Presentation**

The patient is a 57-year-old Malaysian woman presenting with a history of Type 2 diabetes mellitus (T2DM) and hyperlipidemia. T2DM, characterized by insulin resistance and elevated blood sugar levels, was diagnosed based on her medical history and previous HbA1c levels (pre-treatment HbA1c of 6.5 mmol/L). Furthermore, the patient has a history of hyperlipidemia and is currently under continuous management for this condition.

The patient sought treatment at SOL Integrative Wellness Centre in Kuala Lumpur, Malaysia, under the care of Dr. Dasheni Puvanaendran, MBBS. This facility specializes in integrative medicine and holistic approaches to chronic disease management. In pursuit of alternative therapeutic options, the patient underwent a novel stem cell therapy where 100 million mesenchymal stem cells derived from Wharton's jelly of the umbilical cord \[^6\] were intravenously infused through the cephalic vein in a single session.

Mesenchymal stem cells are multipotent cells capable of differentiating into various tissue types and exerting immunomodulatory effects. These MSCs promote endogenous pancreatic islet β-cell regeneration by migrating to injured islet cells and secreting various cytokines and growth factors with paracrine and autocrine activities \[^10\]. Notably, significant regeneration of β-cells and restoration of islet architecture were observed post-infusion \[^11,12\] Lee et al. demonstrated similar effects in streptozocin (STZ)-induced diabetic mice, where MSCs promoted tissue repair by creating a conducive microenvironment for endogenous cell proliferation and function restoration \[^13\].

The treatment protocol was complemented using berberine (500 mg once daily after breakfast) and cinnamon supplements (600 mg once daily after dinner), which are known for their potential benefits in glycemic control and metabolic health.

Clinical laboratory tests were conducted to monitor the patient's response to therapy. Post-treatment assessments revealed significant improvements in glycemic control, with HbA1c levels decreasing to 6.33 mmol/L.

**Clinical Laboratory Test Results:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Pre-Treatment Value</th>
<th>Post-Treatment Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c</td>
<td>9.61 mmol/L</td>
<td>6.33 mmol/L</td>
<td>Improved glycemic control</td>
</tr>
<tr>
<td>C-Reactive Protein</td>
<td>4.5 mg/L</td>
<td>1.48 mg/L</td>
<td>Decreased inflammation, indicative of improved health outcomes and reduced cardiovascular risk.</td>
</tr>
</tbody>
</table>
Liver Function Tests

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Pre-Treatment Value</th>
<th>Post-Treatment Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilirubin, Total</td>
<td>3.81 umol/L</td>
<td>3.29 umol/L</td>
</tr>
<tr>
<td>Albumin</td>
<td>49 g/L</td>
<td>46.20 g/L</td>
</tr>
<tr>
<td>Globulin</td>
<td>28.50 g/L</td>
<td>24.10 g/L</td>
</tr>
<tr>
<td>Alk. Phosphatase (ALP)</td>
<td>66.50 IU/L</td>
<td>57.10 IU/L</td>
</tr>
<tr>
<td>AST (SGOT)</td>
<td>22.90 IU/L</td>
<td>19.10 IU/L</td>
</tr>
<tr>
<td>ALT (SGPT)</td>
<td>29.50 IU/L</td>
<td>15.50 IU/L</td>
</tr>
</tbody>
</table>

The observed changes in liver function markers suggest systemic benefits beyond glycemic and lipid control, indicating a potential role of stem cell therapy in improving overall metabolic health. This case underscores the promise of integrative medicine in addressing complex metabolic disorders like T2DM, highlighting the need for further research and personalized treatment strategies in this field.

**Patient Perspective**
Following stem cell therapy and the incorporation of dietary supplements into her routine, she experienced notable improvements in her blood sugar levels and overall health. This holistic approach has empowered her to actively manage her well-being and explore personalized strategies for enhancing her quality of life. She appreciates the comprehensive care and positive outcomes achieved through this integrative approach.

**Discussion**
This case report illustrates a personalized approach to managing Type 2 diabetes mellitus (T2DM) and hyperlipidemia through integrative medicine. The use of mesenchymal stem cell therapy from Wharton's jelly of the umbilical cord, combined with dietary supplements like berberine and cinnamon, resulted in significant improvements in glycemic control and lipid profiles.

The unique feature of this treatment lies in its holistic nature, addressing multiple aspects of metabolic health. However, limitations include the need for further research to validate these findings in larger populations and assess long-term efficacy and safety. Individualized, comprehensive care remains crucial in optimizing outcomes for patients with complex metabolic conditions like T2DM.

**Conclusion**
This case report demonstrates the potential effectiveness of a personalized and integrative approach in managing Type 2 diabetes mellitus (T2DM) and hyperlipidemia. The combination of mesenchymal stem cell therapy and dietary supplements led to significant improvements in glycemic control and lipid profiles within a real-world clinical context.

These positive outcomes underscore the importance of exploring alternative therapies alongside conventional treatments to optimize patient care and metabolic health. The success of this approach highlights the value of individualized and comprehensive strategies in achieving favorable outcomes for patients with complex metabolic disorders like T2DM. Continued research is essential to further validate and expand upon these promising findings.

**List of abbreviation**
- **T2DM**: Type 2 Diabetes Mellitus
- **HbA1c**: Glycated Haemoglobin
- **LDL Cholesterol**: Low-Density Lipoprotein Cholesterol
- **ALP**: Alkaline Phosphatase
- **AST (SGOT)**: Aspartate Aminotransferase (Serum Glutamic-Oxaloacetic Transaminase)
ALT (SGPT): Alanine Aminotransferase (Serum Glutamic-Pyruvic Transaminase)

Declaration:

All activities performed on the subject in this case report were conducted in accordance with Good Clinical Practice (GCP) guidelines and under the supervision of a qualified physician. The therapeutic interventions, including mesenchymal stem cell therapy and the administration of natural supplements, were carried under the direct guidance of Dr. Dasheni Puvanaendran at SOL Integrative Wellness Centre. The patient's treatment plan and subsequent follow-ups adhered strictly to ethical standards and clinical protocols to ensure patient safety and the validity of the observed outcomes.

References

www.mdpi.com/1660-4601/18/1/318