

Comprehensive Management of Type 2 Diabetes Mellitus by Acupuncture, Ozone Therapy and Following Suo-Xihealthy Life Style Modification

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ABSTRACT

Diabetes Mellitus is a common chronic metabolic disorder characterized by elevated blood glucose levels resulting from insulin resistance or inadequate insulin production. This detailed case report explores the diagnosis and comprehensive management of Type 2 Diabetes Mellitus (DM) in a 38-year-old male, who presented with elevated blood sugar levels. Patient, a married service holder, presents him with a weight of 73 kg and a height of 5'4", resulting in a BMI of 27, categorizing him as overweight. Notably, he has a family history of Type 2 DM, as his mother has been diagnosed with the same condition. The report provides an in-depth analysis of the patient's particulars, treatment approach, lifestyle modifications, adjunctive therapies (ozone therapy and acupuncture), and relevant investigations to monitor his condition.

Key words: Type 2 Diabetes Mellitus (DM), Blood glucose levels, BMI, Acupuncture, Ozone Therapy, Life style modification.

INTRODUCTION

Diabetes Mellitus (DM) refers to a group of prevalent metabolic illnesses that result in high blood sugar levels. The global prevalence of DM has significantly risen during the last three decades, going from 30 million cases in 1985 to 425 million cases in 2017. According to the International Diabetes Federation, it is projected that over 629 million individuals will get diabetes by the year 2045 if the present pattern persists [1].

Diabetes mellitus (DM) and its associated pathophysiologic alterations that impact many organs impose a significant burden on both patients and the entire healthcare systems [2]. Type 2 diabetes mellitus (T2DM) constitutes about 90% of

diabetes cases in the adult population. Insulin resistance is the primary factor responsible for the development of persistent hyperglycemia in individuals with diabetes. Type 2 diabetes mellitus (T2DM) occurs as a result of the activation of several pathways and variables that contribute to insulin resistance and malfunction of the β -cells. The development of Type 2 Diabetes Mellitus (T2DM) is influenced by a combination of genetic and environmental variables. Insulin resistance and β -cell dysfunction are the primary characteristics of type 2 diabetes mellitus (T2DM) that arise from disrupted homeostasis [3]. The basic physiological problems are caused by the combined effect of β -cell failure (which accounts for approximately 80% of their β -cell function) and insulin resistance in muscles and the liver, forming a vicious triad. Nevertheless, T2DM is traditionally understood as a condition

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characterized by insufficient insulin levels and reduced responsiveness to insulin. However, recent understanding of the pathophysiology of T2DM indicates the involvement of additional important factors in the inadequate production of insulin and its impaired functionality. The pancreatic islets consist of β -cells (48-59%) that produce insulin, α -cells (33-46%) that release glucagon, δ -cells that release somatostatin (SsT), and F cells that release polypeptides (PPs) in almost equal amounts [4]. Furthermore, paracrine interactions take place in the order of β -cells, α -cells, δ -cells, and PP-cells/F-cells [5]. Although the focus is currently on β -cell interactions, it is essential to further investigate the interactions of other cells in the pancreas to fully comprehend their contributions to glucose homeostasis. The development of glucose resistance in type 2 diabetes mellitus (T2DM) is primarily influenced by various factors, including accelerated breakdown of fat cells (lipolysis), deficiency or resistance to incretin hormones in the gastrointestinal tract, excessive production of glucagon by α -cells, increased reabsorption of glucose by the kidneys, and insulin resistance in the brain. These factors interact in complex ways with genes associated with T2DM [6]. Pharmacological therapies alone are insufficient to enhance the overall health status of T2DM patients; it is imperative to make significant modifications to their lifestyle as well. According to reports, ozone therapy increases the activity of the antioxidant system, which helps to decrease long-term oxidative stress. This, in turn, improves blood flow, delivers more oxygen to tissues with reduced blood supply, enhances insulin secretion and effectiveness, and also induces feelings of euphoria and well-being [7]. For example, ozone therapy in patients with diabetic foot normalized levels of organic peroxides, activated superoxide dismutase, prevented oxidative stress, and improved glycemic control [8]. In addition, ozone treatment also diminished the oxidative harm on proteins and lipids in patients suffering from multiple sclerosis [9, 10]. The report provides an in-depth analysis of the patient's particulars, treatment approach, lifestyle modifications, adjunctive therapies (ozone therapy and acupuncture), and relevant investigations to monitor his condition.

CASE PRESENTATION

A 38-year-old male diagnosed with Type 2 Diabetes Mellitus (DM). Patient a married service holder working as a waiter presents him with a weight of 73 kg and a height of 5'4", resulting in a BMI of 27, categorizing him as overweight. Notably, he has a family history of Type 2 DM, as his mother has been diagnosed with the same condition. This case highlights the relevance of Patient's demographics and medical history in the context of his Type 2 DM diagnosis and emphasizes the need for personalized management strategies to address his specific healthcare needs.

TREATMENT APPROACH

Lifestyle Modification

Patient's treatment began with a focus on lifestyle modifications, a cornerstone in managing Type 2 DM by Suo-Xi. His healthcare provider emphasized the importance of: A balanced diet tailored to his needs, with an emphasis on portion control and carbohydrate monitoring. Regular physical activity, including aerobic exercises and resistance training. Weight management to achieve an ideal body weight (IBW) of 62 kg. Regular monitoring of blood sugar levels using a glucometer.

Ozone Therapy

Ozone therapy was introduced as an adjunctive treatment to enhance patient's overall metabolic function. Ozone therapy is believed to improve oxygen utilization and reduce oxidative stress. Israfil received multiple sessions of ozone therapy under medical supervision, which aimed to: Improve insulin sensitivity, promote better glucose metabolism, Reduce inflammation and oxidative stress.

Acupuncture

Acupuncture was incorporated into the treatment plan to address the physical and emotional aspects of diabetes management. Acupuncture sessions focused on specific acupoints associated with glycemic control and stress relief. The benefits of acupuncture included: Regulation of blood sugar levels, Stress reduction and improved overall well-being, Enhanced relaxation and mental clarity.

INVESTIGATIONS AND MONITORING

To comprehensively monitoring followed of patient's progress in managing his Type 2 Diabetes Mellitus (DM), a series of essential investigations were diligently conducted at two crucial time points:

Initial Assessment (29.11.23)

Random Blood Sugar (RBS): At the outset, patient's RBS level was measured at 10.9 mmol/l. This initial reading signified elevated blood sugar levels, indicating uncontrolled diabetes.

HbA1C: Concurrently, his HbA1C level, which provides a measure of long-term blood glucose control, stood at 6.9%. This percentage reflected a higher-than-desirable average blood sugar level over the preceding few months.

Follow-Up Assessment (02.01.24)

Random Blood Sugar (RBS): During the follow-up assessment on 02.01.24, Israfil's RBS level showed significant improvement, measuring at 7.1 mmol/l. This reduction indicated a more favorable glycemic status, demonstrating his response to the treatment plan.

HbA1C: Similarly, his HbA1C level witnessed a notable decrease, measuring at 5.8%. This decrease in HbA1C reflected a substantial enhancement in long-term blood sugar control, indicating the effectiveness of the implemented interventions.

In summary, patient's progress in managing his Type 2 DM was meticulously tracked through these investigations. The initial elevated RBS and HbA1C levels were indicative of

uncontrolled diabetes. However, the subsequent follow-up assessments revealed substantial improvements in both random blood sugar and HbA1C levels, highlighting the positive impact of the treatment plan and lifestyle modifications. These results underscored the importance of ongoing monitoring and reinforced the significance of tailored interventions in achieving better glycemic control and overall diabetes management.

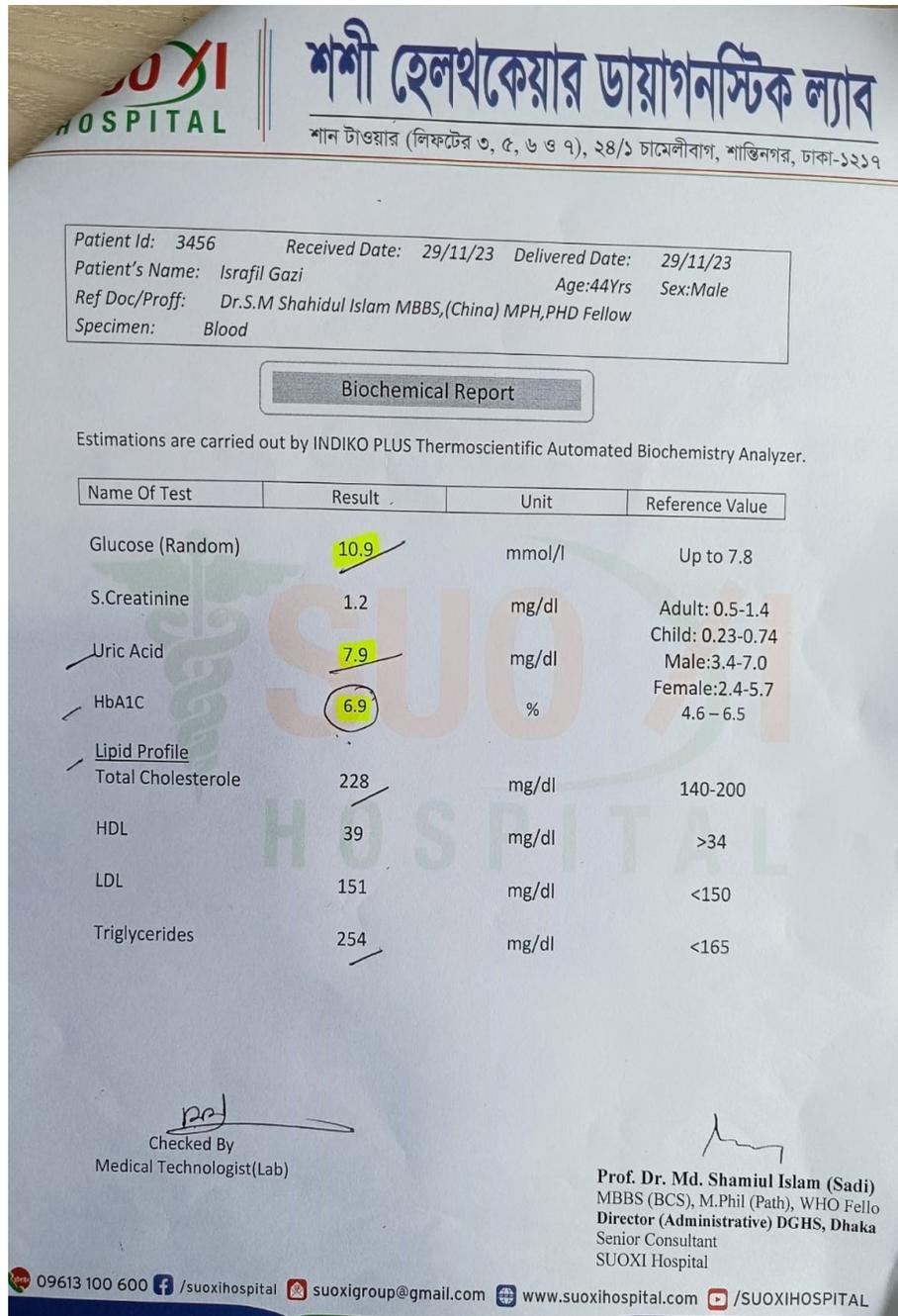


Figure I. Before Treatment

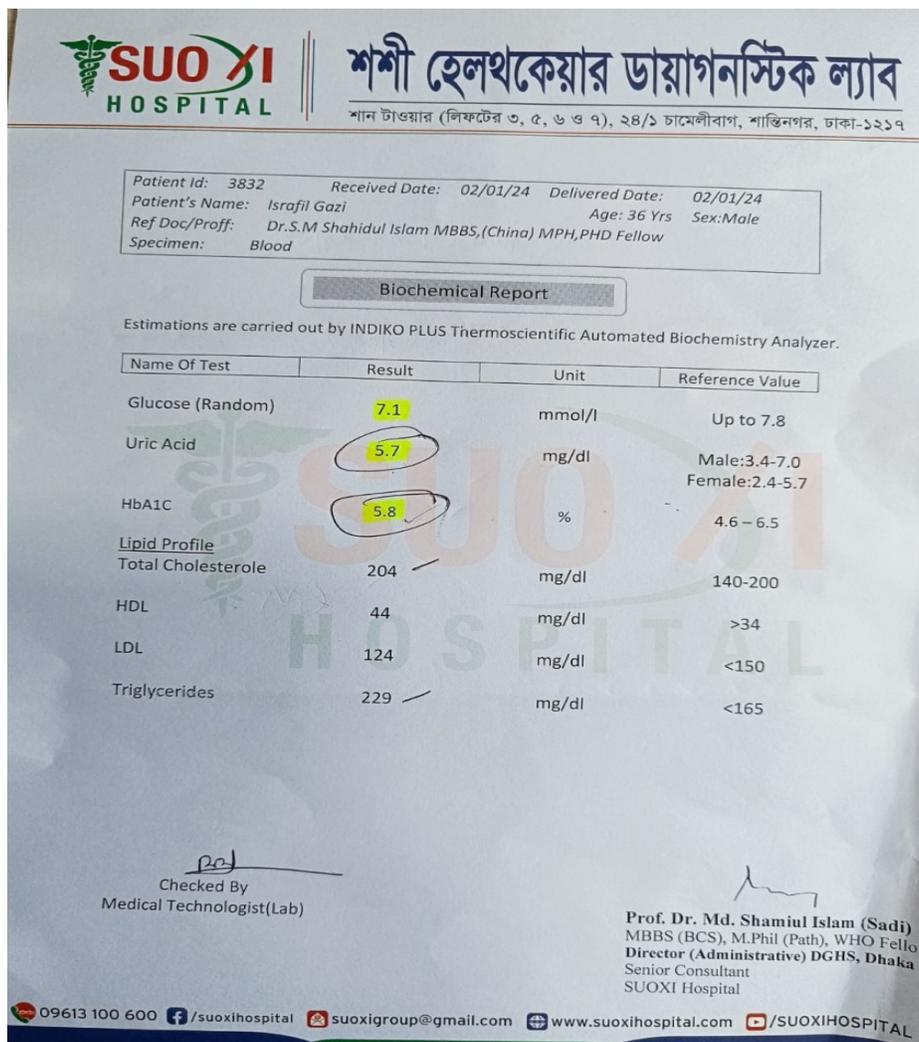


Figure 2. After Treatment

DISCUSSION

This case report presented a unique approach to managing uncontrolled diabetes in patient, showcasing the potential of integrative medicine in conjunction with conventional therapy. While further research is warranted, the positive outcomes observed raise intriguing possibilities for future diabetes management strategies.

Patient presented with elevated blood sugar levels (10.9 mmol/l) and an HbA1C (6.9%) indicative of uncontrolled diabetes at the initial assessment. His comprehensive treatment plan, including lifestyle modification, ozone therapy, and acupuncture, showed promising results during the follow-up assessment. The reduction in RBS (to 7.1 mmol/l) and HbA1C to (5.8%) on 02.01.24 indicated improved glycemic control and reduced risk of long-term complications.

Elevated blood sugar levels and HbA1C values have been strongly associated with an increased risk of microvascular and macrovascular complications in individuals with diabetes [11]. Patient's treatment plan began with a primary focus on lifestyle modification, a cornerstone in T2DM management. Dietary interventions, emphasizing portion control and carbohydrate monitoring, played a pivotal role in his care. Research supports the critical role of nutrition in glycemic control, with studies highlighting the benefits of a balanced diet in regulating blood sugar levels [12]. Regular physical activity, comprising aerobic exercises and resistance training, was another essential aspect of Israfil's treatment plan. Aerobic exercises are known to enhance insulin sensitivity, leading to improved glucose utilization and glycemic control [13]. Additionally, resistance training helps build lean muscle mass, which can positively impact insulin action [14]. Weight management, with a target of achieving an ideal body weight

(IBW), was pursued diligently. Excess body weight is a known risk factor for T2DM and is associated with insulin resistance [15]. Achieving and maintaining an IBW is a fundamental goal in diabetes management. The incorporation of adjunctive therapies, such as ozone therapy and acupuncture, was a notable feature of Israfil's treatment plan. Ozone therapy, which involves the administration of ozone to stimulate metabolic processes and reduce oxidative stress, has shown potential in improving glycemic control and reducing inflammation in diabetes [16]. Acupuncture, as a complementary therapy, can contribute to better blood sugar regulation and stress reduction [17]. The follow-up assessment on 02.01.24 revealed significant improvements in Israfil's glycemic control. His RBS had decreased to 7.1 mmol/l, while his HbA1C had dropped to 5.8%. These findings indicated a positive response to the treatment plan, reflecting improved glycemic control and a reduced risk of long-term complications. Maintaining target levels of HbA1C is associated with a lower risk of diabetes-related complications [18].

LIMITATIONS AND FUTURE RESEARCH

It is important to acknowledge the limitations of this case report. The single-case design precludes generalizability, and the precise mechanisms of action for ozone therapy and acupuncture in diabetes require further investigation. Additionally, the potential for placebo effects and interactions with conventional medications must be considered.

Future Research Efforts Should Focus On

Controlled clinical trials: Conducting well-designed randomized controlled trials is crucial to assess the efficacy and safety of integrative medicine approaches in diabetes management compared to conventional therapy alone.

Mechanism of action studies: Elucidating the specific mechanisms by which ozone therapy and acupuncture may benefit glycemic control would provide valuable insights for optimizing treatment strategies.

Standardization of protocols: Establishing standardized protocols for integrating ozone therapy and acupuncture into diabetes management plans would ensure consistency and reproducibility in clinical practice.

CONCLUSION

This case report underscores the significance of a multifaceted approach in managing Type 2 Diabetes Mellitus. Patient's journey from diagnosis to treatment and monitoring highlights the positive impact of Suo-Xi healthy lifestyle modifications, alongside adjunctive therapies like ozone therapy and

acupuncture, on glycemic control and overall well-being. Regular monitoring of blood sugar levels and HbA1C remains essential in assessing the effectiveness of the treatment plan. Further research and long-term follow-up are required to validate the sustained benefits of these interventions in diabetes management and to provide valuable insights for future patients.

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