

Case Investigation: Monitoring 16-year-old Patient with Type 2 Diabetes Mellitus

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Abstract

This case investigation focuses on the comprehensive management and monitoring of Type 2 Diabetes Mellitus (T2DM) in a 16-year-old patient. The adolescent presents with symptoms of increased thirst, frequent urination, fatigue and unintended weight loss. Diagnostic evaluations reveal elevated fasting plasma glucose levels and a high HbA1c, confirming the diagnosis of T2DM. The management plan incorporates lifestyle modifications, including dietary changes and increased physical activity, alongside pharmacotherapy with Metformin. Regular monitoring of blood glucose levels, HbA1c and associated metabolic parameters is emphasized to ensure effective disease management and prevent complications. This case highlights the unique challenges and considerations in managing T2DM in adolescents and underscores the importance of a multidisciplinary approach in achieving optimal outcomes.

Keywords: Type 2 diabetes mellitus • Metformin • Blood glucose monitoring • HbA1c • Diabetes management

Introduction

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and relative insulin deficiency, leading to elevated blood glucose levels. Traditionally associated with adults, T2DM is increasingly being diagnosed in adolescents, largely due to rising obesity rates, sedentary lifestyles and poor dietary habits [1]. This shift highlights the need for early detection and effective management strategies tailored to the unique needs of younger patients. Adolescents with T2DM face distinct challenges compared to adults, including the impact of puberty on insulin sensitivity, the influence of social and behavioral factors on lifestyle changes and the need for family involvement in management. The condition often presents with symptoms such as increased thirst, frequent urination, fatigue and unintended weight loss, which may be attributed to other causes or dismissed as normal teenage changes [2]. As a result, T2DM in adolescents can sometimes go undiagnosed until significant complications develop. Effective management of T2DM in adolescents requires a multifaceted approach that includes lifestyle modifications, pharmacotherapy and ongoing monitoring. Lifestyle interventions, such as dietary changes and increased physical activity, are crucial for improving glycemic control and addressing obesity-related factors. Medications like Metformin are commonly used to enhance insulin sensitivity and control blood glucose levels. Regular monitoring of blood glucose, HbA1c and other metabolic parameters is essential for assessing treatment efficacy and preventing complications [3].

Case Presentation

A 16-year-old boy presents with a range of symptoms that have been noticeable over the past six months. He reports experiencing increased thirst, frequent urination, fatigue and an unintended weight loss of about 10 pounds.

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Received: 02 July, 2024, Manuscript No. jccr-24-146221; **Editor Assigned:** 04 July, 2024, PreQC No. P-146221; **Reviewed:** 17 July, 2024, QC No. Q-146221; **Revised:** 23 July, 2024, Manuscript No. R-146221; **Published:** 30 July, 2024, DOI: 10.37421/2165-7920.2024.14.1614

The boy has been drinking more fluids than usual and experiencing frequent night-time urination, which has significantly disrupted his sleep. Additionally, he feels unusually tired and has observed a general decrease in his energy levels. These symptoms were initially thought to be related to the pressures of school and personal life, but their persistence prompted a medical evaluation.

The boy's medical history is otherwise unremarkable, with no significant past illnesses or surgeries. He has no known chronic conditions and his vaccinations are current. His family history includes Type 2 Diabetes Mellitus in a paternal grandparent and hypertension in a parent. His lifestyle includes minimal physical activity and a diet high in carbohydrates, with low consumption of fruits and vegetables. He does not smoke and drinks alcohol infrequently. On physical examination, the boy is slightly overweight with a body mass index (BMI) of 28.4 kg/m², indicating obesity. His vital signs are mostly within normal ranges, but his blood pressure is slightly elevated at 130/85 mmHg. Examination findings reveal dry skin without rashes or infections. There are no abnormalities in the cardiovascular, respiratory, or abdominal examinations and no evidence of edema or cyanosis in the extremities.

Diagnostic tests confirm the diagnosis of Type 2 Diabetes Mellitus. The boy's fasting plasma glucose level is 155 mg/dL, which is elevated compared to the normal range of less than 100 mg/dL. His HbA1c level is 7.8%, indicating poor long-term glycemic control, as the target for adolescents is typically below 7.0%. An Oral Glucose Tolerance Test (OGTT) shows a 2-hour postprandial glucose level of 220 mg/dL, further confirming the diagnosis. The lipid profile indicates elevated LDL and triglycerides, suggesting additional metabolic concerns. Renal function tests are normal, indicating no significant renal impairment.

The management plan includes several components. Lifestyle modifications are prioritized, focusing on a balanced diet with low-glycemic index foods and increasing physical activity to at least 60 minutes per day. Weight management is emphasized, with a goal of losing 5-10% of the current body weight. Pharmacotherapy with Metformin 500 mg twice daily is initiated to aid in controlling blood glucose levels. Regular monitoring of blood glucose levels, HbA1c and lipid profile is essential to track progress and make necessary adjustments to the treatment plan. Education for the boy and his family is a critical part of the management strategy. They are instructed on the importance of adhering to the medication regimen, recognizing symptoms of hypo- and hyperglycemia and making effective lifestyle changes. A follow-up appointment is scheduled in three months to assess treatment efficacy and adjust the management plan as needed.

Results and Discussion

The diagnostic evaluation of the boy confirms the presence of Type 2 Diabetes Mellitus (T2DM). His fasting plasma glucose level is elevated at 155 mg/dL, exceeding the normal range and indicating impaired glucose regulation [4]. The HbA1c level is 7.8%, reflecting inadequate long-term glycemic control, as the target for adolescents is generally below 7.0%. The Oral Glucose Tolerance Test (OGTT) shows a 2-hour postprandial glucose level of 220 mg/dL, further supporting the diagnosis of T2DM. Additionally, the lipid profile reveals elevated LDL and triglycerides, pointing to concurrent dyslipidemia. Renal function tests are normal, suggesting that there is no significant renal impairment at this stage. The case of the 16-year-old boy illustrates several critical aspects of managing Type 2 Diabetes Mellitus in adolescents. The combination of increased thirst, frequent urination, fatigue and unintended weight loss, along with the elevated fasting plasma glucose and HbA1c levels, confirms the diagnosis of T2DM. These symptoms, often attributed to other causes in adolescents, underscore the need for thorough evaluation when such signs are present [5,6].

The elevated HbA1c level indicates poor glycemic control, which necessitates a comprehensive management plan. The choice of Metformin as the initial pharmacotherapy is supported by its effectiveness in reducing blood glucose levels and its safety profile [7]. Addressing the concurrent dyslipidemia through lifestyle changes and potentially additional medications is also important, as elevated LDL and triglycerides increase the risk of cardiovascular complications. Lifestyle modifications, including dietary changes and increased physical activity, are essential for improving glycemic control and managing weight. The boy's current sedentary lifestyle and high-carbohydrate diet are significant risk factors that need to be addressed [8]. Education for the patient and his family is crucial to ensure adherence to the treatment plan and effective management of the condition. Overall, this case highlights the importance of a multifaceted approach in managing T2DM in adolescents. Regular monitoring and follow-up are vital to assess the effectiveness of the treatment plan, make necessary adjustments and support the patient in making lasting lifestyle changes. This comprehensive approach aims to improve the boy's overall health, achieve better glycemic control and minimize the risk of long-term complications associated with diabetes [9].

Conclusion

The case of the 16-year-old boy underscores the growing prevalence and complexities of managing Type 2 Diabetes Mellitus (T2DM) in adolescents. The combination of clinical symptoms and diagnostic findings, including elevated fasting plasma glucose and HbA1c levels, confirms the diagnosis and highlights the need for early and effective intervention. The management plan, which includes lifestyle modifications such as dietary changes and increased physical activity, alongside pharmacotherapy with Metformin, is crucial for controlling blood glucose levels and addressing associated metabolic abnormalities. Regular monitoring and follow-up are essential to evaluate treatment efficacy, make necessary adjustments and prevent complications. By integrating medical treatment with lifestyle interventions, the goal is to improve glycemic control, enhance overall health and reduce the risk of long-

term complications, ultimately leading to a better quality of life for adolescents with T2DM.

Acknowledgement

None.

Conflict of Interest

None.

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How to cite this article: Kropley, Francesca. "Case Investigation: Monitoring 16-year-old Patient with Type 2 Diabetes Mellitus." *J Clin Case Rep* 14 (2024): 1614.