

Type 2 Diabetes Mellitus – A Pathology on the Rise How do we Monitor it?

Sur Genel^{1,2*}, Floca Emanuela¹, Sur M Lucia¹ and Sur Daniel¹

¹University of Medicine and Pharmacy, Iuliu Hatieganu, Cluj-Napoca, Romania

²Emergency Clinical Hospital for Children, Cluj-Napoca, Romania

Abstract

Type 2 diabetes is a chronic disease widespread in the world. Currently it is believed that there are over 500 million diabetics in the world and their number increases every year. This increase is primarily due to unhealthy eating habits, sedentary lifestyle, obesity and stress. In an OMS report stated that "individuals live dangerously", this for failure to comply of the minimum precepts regarding lifestyle. Correct monitoring of the diabetic patient for preventing complications is an important aspect in the disease evolution. Methods that allow an accurate monitoring of diabetes include glycosylated hemoglobin, self-monitoring of blood glucose and continuous glucose monitoring with a system that measures interstitial glucose concentration. It is considered that the determination of glycosylated hemoglobin is the gold standard in monitoring diabetic patients, but the other two methods provide complementary information.

Keywords: Type 2 diabetes mellitus; Monitoring; Glycosylated hemoglobin

Despite existing therapeutic measures, maintaining a normal blood sugar or as close to normal is not easily obtained. Factors that contribute to achieving this goal are [1,2]:

- The patient through lifestyle and adherence to therapeutic and nutritional recommendations;
- Doctor by optimal control of blood glucose changes;
- Therapeutic possibilities tailored to each patient;
- Social environment through its influence.

From this point of view the blood glucose monitoring and awareness of patient for maintaining optimal blood sugar may be ways to get success in monitoring and treatment of diabetes.

Glycosylated hemoglobin (HbA1c) is considered the gold standard in monitoring patients with type 2 diabetes. There are studies that demonstrated a direct relationship between the risk of developing complications of diabetes, including mortality, and increased HbA1c level. The rate of increase of risk for microvascular disease associated with elevated HbA1c is greater than the risk of macrovascular disease. Achieving lowering HbA1c leads to a decrease in the risk of micro and macrovascular complications [2,3]. Thus intensive control of diabetes by maintaining lower HbA1c levels delays the onset and slows the evolution of diabetic retinopathy, nephropathy, neuropathy, and cardiovascular disease. The level of HbA1c reflects the average blood glucose retrospectively for about 2-3 months. A limitation of HbA1c is that it not provides information about glucose concentrations throughout the day. Therefore it does not allow immediate changes of nutritional and therapeutic approach [4]. It is recommended to determine HbA1c twice a year in patients who achieve good control of blood glucose and four times in cases which are not controlled therapeutically. Noted that falsely low values of HbA1c may occur in patients with hemolytic anemia, some hemoglobinopathies, and in patients who have received transfusions from nondiabetic patients [2,4].

Real-time measurement of the blood glucose levels complete the information offered by the HbA1c. Self-Monitoring of Blood Glucose (SMBG) is an effective tool in the self-management of glucose levels at diabetic patients. This measurement is done with a glucometer and it

is glucose dosing in capillary blood. Thus dosing with the glucometer is the most accessible method of self-measurement of blood glucose. Measurement of glucose in real time provides information about both hypoglycemia and hyperglycemia.

Depending on the case the patient must take an immediate therapeutic decision [4,5]. Patient adapts medication, diet and physical activity according to the values detected.

The possibility of self-monitoring of blood glucose transfers immediate decisions from doctor to patient. Glucose self-measurement frequency should be individualized according to blood glucose and treatment. Patients undergoing intensive treatment with insulin should monitor their blood glucose levels daily. Some studies suggest that patients with type 2 diabetes not using insulin should benefit from SMBG [5,6]. These patients could better understand the factors that influence disease. They may become more responsible and improve their quality of life.

There was a significant reduction in HbA1c levels in patients that included SMBG as a method to monitoring diabetes. Therefore the risk of complications will decrease by applying both methods to monitor patients with type 2 diabetes [6].

Continuous Glucose Monitoring System (CGMS) from the interstitial fluid is a useful method that has been recently applied to type 2 diabetes. Method offers the possibility to see the glycemic profile over a week and to see real-time glucose values. This method helps to adjust therapy, nutrition and psychosocial activities. At the same time the patient can be educated to better collaboration and adherence to treatment. Through this parameters, method may contribute to

*Corresponding author: Sur Genel, University of Medicine and Pharmacy, Iuliu Hatieganu, Cluj-Napoca, Romania, Tel: 0040724504964; E-mail: surgenel@yahoo.com

Received November 20, 2013; Accepted November 26, 2013; Published November 26, 2013

Citation: Genel S, Emanuela F, Lucia SM, Daniel S (2013) Type 2 Diabetes Mellitus – A Pathology on the Rise How do we Monitor it? Pharmaceut Anal Acta. 4: e160. doi: [10.4172/2153-2435.1000e160](http://dx.doi.org/10.4172/2153-2435.1000e160)

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maintaining optimal glycemc profile over a long period of time [7,8].

The main indications and benefits of using CGMS include [9]:

- To register the real glycemc profile over a 1, 3, 5, or 7 days;
- To identify hypoglycemia and hyperglycemia and adapt therapeutic strategies to correct them;
- To evaluate therapeutic efficiency;
- To use results in medical research;
- To assess glycemc profile in diabetic patients with other associated diseases or patients with other pathological conditions.

Conclusions

The 3 methods used to monitor glucose (HbA1c, SMBG, CGMS) provide distinct information and complement each other in the same time.

HbA1c is the gold standard for monitoring patients with type 2 diabetes.

SMGB show real-time blood glucose and glycemc profile in an elected time period, enabling adjustment of therapy and nutrition.

CGM show glycemc status and is a commonly used method in research.

References

1. American Diabetes Association (2010) Diagnosis and classification of diabetes mellitus. *Diabetes Care* 33: S62-S69.

2. Rydén L, Standl E, Bartnik M, Van den Berghe G, Betteridge J, et al. (2007) Guidelines on diabetes, pre-diabetes, and cardiovascular diseases: executive summary. The Task Force on Diabetes and Cardiovascular Diseases of the European Society of Cardiology (ESC) and of the European Association for the Study of Diabetes (EASD). *Eur Heart J* 28: 88-136.
3. Duckworth W, Abraira C, Moritz T, Reda D, Emanuele N, et al. (2009) Glucose control and vascular complications in veterans with type 2 diabetes. *N Engl J Med* 360: 129-139.
4. Poolsup N, Suksomboon N, Rattanasookchit S (2009) Meta-analysis of the benefits of self-monitoring of blood glucose on glycemc control in type 2 diabetes patients: an update. *Diabetes Technol Ther* 11: 775-784.
5. Clar C, Barnard K, Cummins E, Royle P, Waugh N; Aberdeen Health Technology Assessment Group (2010) Self-monitoring of blood glucose in type 2 diabetes: systematic review. *Health Technol Assess* 14: 1-140.
6. Polonsky WH, Fisher L, Schikman CH, Hinnen DA, Parkin CG, et al. (2011) Structured self-monitoring of blood glucose significantly reduces A1C levels in poorly controlled, noninsulin-treated type 2 diabetes: results from the Structured Testing Program Study. *Diabetes Care* 34: 262-267.
7. Vigersky RA, Fonda SJ, Chellappa M, Walker MS, Ehrhardt NM (2012) Short- and long-term effects of real-time continuous glucose monitoring in patients with type 2 diabetes. *Diabetes Care* 35: 32-38.
8. Ehrhardt NM, Chellappa M, Walker MS, Fonda SJ, Vigersky RA (2011) The effect of real-time continuous glucose monitoring on glycemc control in patients with type 2 diabetes mellitus. *J Diabetes Sci Technol* 5: 668-675.
9. Sartore G, Chillelli NC, Burlina S, Di Stefano P, Piarulli F, et al. (2012) The importance of HbA1c and glucose variability in patients with type 1 and type 2 diabetes: outcome of continuous glucose monitoring (CGM). *Acta Diabetol* 49: S153-S160.

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