Practice of Glycemic Self-Monitoring in Diabetic Patients Followed at the Endocrinology Department of Donka University Hospital in Guinea

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Abstract

Diabetes is a chronic pathology whose evolution is marked by micro and macroangiopathic complications. Optimal management can prevent the onset of complications and improve patients' quality of life. **Objectives:** To determine the frequency of self-monitoring of blood glucose and to describe the errors found during self-monitoring in diabetic patients followed at the Endocrinology Department of Donka University Hospital in Guinea. **Materials and methods:** Descriptive cross-sectional study carried out between August and September 2020 involving diabetic patients followed up at the Endocrinology and Diabetology Department of the Donka National Hospital, CHU Conakry. **Results:** A total of 301 patients were enrolled, with an average age of 44.24 ± 21.01 years. 64.12% were female. Type 2 diabetes predominated in 64% of cases. The mean duration of diabetes was 6.14 ± 4.67 years, and 75.08% of patients lived in urban areas. Patients were on insulin in 36.21% of cases, insulin and biguanides (26.25%), hypoglycemic sulfonamide and biguanides (19.27%) and biguanides in 18.27% of cases. The frequency of self-monitoring of blood glucose was 43%, and 38% of patients made errors, notably reusing lancets (60%), not checking the expiration date (55.65%) and not washing their hands (48%). **Conclusion:** This study shows that self-monitoring of blood glucose is not performed by the majority of patients. Numerous errors were identified during blood glucose testing. Continued

therapeutic education on the use of blood glucose meters will help empower patients and improve their quality of life.

Keywords

Self-Monitoring of Blood Glucose, Diabetes, Conakry University Hospital

1. Introduction

Diabetes is a chronic pathology whose evolution is marked by micro and macroangiopathic complications. Optimal management helps prevent complications and improve patients' quality of life. The treatment of diabetes is based on algorithms that are regularly revised. Self-monitoring of blood glucose is a key component of these algorithms. It aims to make patients autonomous, and helps to secure treatment by adapting insulin doses and insulin meters [1]-[6]. The use of capillary blood glucose meters makes it possible to control blood glucose levels, thanks to the rapid availability of results.

In developed countries, notably France, blood glucose meters are reimbursed every 4 years, and auto-sensors every year for adults [4].

In low-income countries, however, self-monitoring equipment remains inaccessible due to lack of social security coverage. Although self-monitoring of blood glucose is essential, compliance with the conditions under which it is carried out is vital if the results are to be reliable [5]. In the literature, the most frequently described errors in the performance of capillary glycemia were failure to wash hands, use of disinfectants, lesions at the puncture site and waste management [7].

In Guinea, as in other developing countries, no data are available on the conditions of use of blood glucose meters by the quality control departments of health facilities.

We therefore conducted this study with the aim of determining the frequency of self-monitoring of blood glucose levels in diabetic patients undergoing outpatient care in the diabetology department of the Donka National Hospital of the University Hospital of Conakry, and describing the errors encountered during capillary blood glucose testing, with a view to optimizing diabetes management.

2. Materials and Methods

Descriptive cross-sectional study was carried out between August and September 2020, including 301 diabetic patients with self-monitoring of blood glucose who were treated as outpatients at the Endocrinology and Diabetology Department of CHU Donka. All diabetic patients treated with insulin or hypoglycemic sulfonamide who had a blood glucose meter were included in our series.

Self-monitoring of blood glucose was defined as the measurement of blood glucose in capillary blood at the fingertip using a blood glucose meter.

The patients received had their own blood glucose meters, which they had acquired in pharmacies in the capital Conakry. During follow-up, patients were taught how to self-monitor their blood glucose either by nurses on an outpatient basis, during hospitalization or in pharmacies.

Patients were received by the nurse in a dedicated room, and then asked to perform capillary blood glucose tests with their own meters. This study did not investigate how the meter was conditioned before use. The nurse notes the steps in the procedure and fills in a grid designed for this purpose. Any errors found are then listed and explained to the patient. Additional data, in particular epidemiological, clinical and therapeutic characteristics, were sought and analyzed.

The epidemiological and clinical characteristics described were age, sex, origin, type of diabetes and duration of disease progression.

Therapeutic characteristics included insulin, biguanides, insulin-biguanide combinations and biguanides plus hypoglycemic sulfonamides. Errors in self-monitoring of blood glucose were: failure to wash hands, use of disinfectants, reuse of test strips, failure to check the expiration date of test strips, failure to close the test strip box, prolonging the use of a box that had been opened for more than 3 months.

Data entry and statistical analysis were performed using SPSS software. Qualitative variables were expressed as numbers and percentages, while quantitative variables were expressed as means and standard deviations.

3. Results

The mean age of patients was 44.24 ± 21.01 years, and 64.12% were female. Type 2 diabetes predominated in 64% of cases. The mean duration of diabetes was 6.14 ± 4.67 years, and patients lived in urban areas in 75.08% of cases. A detailed description of the population is given in Table 1.

Table 1. Description of the population according to epidemiological and clinical characteristics.

Epidemiological and clinical characteristics.	Workforce	%
Average age = 44.24 ± 21.01 ans		
Gender		
Female	193	64.12
Male	108	35.88
Origin		
Urban	226	75.08
Rural	75	24.92
Type of diabetes		
Type 1 diabetes	109	36.21
Type 2 diabetes	192	63.79
Average duration of diabetes = 6.14 ± 4.67 ans		

The patients were on insulin in 36.21% of cases, on a combination of insulin and biguanides (26.25%), on a combination of hypoglycemic sulfonamide and biguanides (19.27%) and on biguanides in 18.27% of cases. These data are collated in Table 2.

Errors during blood glucose testing were found in 38.20% of cases (115/301). These included reuse of lancets 69 (60%), failure to check expiration date 64 (55.65%) and failure to wash hands 55 (48%). These data are described in Table 3.

4. Discussion

This is a systematic collection of data on the practice of self-monitoring of blood glucose in the Endocrinology and Diabetology Department of the Donka National Hospital in Guinea.

In our series, self-monitoring of blood glucose was performed in 43% of cases, compared with 57% of patients who did not. This finding could be explained by the high cost of capillary blood glucose meters in Guinea. In the absence of universal health coverage, health-related costs are borne by patients and their families.

Self-monitoring equipment is still inaccessible due to the scarcity of financial

Table 2. Therapeutic characteristics.

Therapeutic characteristics	Workforce	%
Insulin treatment	109	36.21
Insulin + biguanide treatment	79	26.25
Treatment with sulphonamides + Biguanides	58	19.27
Treatment with Biguanides alone	55	18.27

Table 3. Errors identified during blood glucose testing.

Errors identified by type of diabetes and treatment	T1D (n = 82)	T2D on insulin and biguanides (n = 14)	T2D on hypoglycemic sulfonamides and biguanides (n = 10)
No hand washing	46	3	06
Use of a disinfectant	19	3	05
Reusing the lancet after use	59	6	04
Failure to check strip expiration date	57	4	03
Failure to close the box of blood glucose test strips	10	00	09
Use of a can opened more than 3 months ago	08	08	02
Failure to use a needle container	27	02	00

resources. The population lives below the national poverty line, estimated at 13,679 GNF/person/day (1.3 EUR) in 2019 [8]. However, in Western countries, notably France, a blood glucose meter is reimbursed every 4 years, and a blood glucose meter is reimbursed every year for adults [5]. In children and adolescents, two meters are reimbursed every 4 years, and two meters every year. These tools are dispensed in pharmacies and reimbursed by the health insurance scheme on presentation of a medical prescription [5].

Self-monitoring of blood glucose plays a central role in adjusting insulin and sulphonylurea doses. It should be more regular in circumstances where the risk of hypoglycemia is greater [9].

It should not be systematic in type 2 diabetes, unless insulin therapy or treatment with insulin inhibitors is instituted [10].

In recent years, therapeutic education incorporating SMBG has made it possible to encourage patients to self-manage their treatment [11] [12]. Self-monitoring of blood glucose was carried out in 43% of cases, and 38% of patients made errors when performing self-monitoring.

The most frequent errors were reuse of lancets (60%), failure to check the expiration date of test strips (55.65%) and non-washing of hands in 48% of cases.

Non-washing of hands, induced by skin creams and sweat, can be a source of erroneous results. These errors were found in both type 1 and type 2 diabetics in our study. Patients with type 1 diabetes, *i.e.* 59 out of 82 cases, reused the lancet despite the free availability of lancets provided by the "Changing Diabetes in Children" program in Guinea.

These errors could be related to the lack of updated training in personalized therapeutic education on the subject.

Our results are consistent with those reported in the literature [13] [14].

A study by Lahlou K *et al*. found that almost 25% of patients reused the lancet, while 8% used alcohol to disinfect their fingers [15].

Another study by Sekkai M *et al*. showed that 20% of diabetic patients did not use their blood glucose meters correctly, and half of them did not check the expiration date of test strips [15]. In a 2005 study of blood glucose meter use in Guinea, Baldé *et al*. described no technical errors in meter handling or in the sequence of blood glucose tests [16]. The limitation of this study was its short duration.

5. Conclusion

This study shows that self-monitoring of blood glucose is not performed by the majority of patients. Numerous errors were identified during blood glucose testing. Continued therapeutic education in the use of blood glucose meters will help to empower patients and improve their quality of life.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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