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Acute Metabolic Complications of Diabetes in the Emergency Department of the CHNCAK of Touba: Epidemiological, Clinical, Therapeutic and Evolutionary Aspects

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Abstract

Introduction: Diabetes mellitus comprises a spectrum of metabolic disorders characterised by chronic hyperglycaemia arising from inadequate insulin secretion, impaired insulin action, or both; acute metabolic complications (AMCs) are abrupt metabolic derangements directly related to the natural history of diabetes. We sought to quantify the frequency of AMCs among emergency department admissions, describe their epidemiological and diagnostic profiles, and identify factors associated with their occurrence. ***Methods:*** Twelve-month retrospective descriptive analytic study at the Emergency Department of the National Hospital Center Cheikh Ahmadoul Khadim (Touba), including all adults (≥18 years) with known or newly diagnosed diabetes admitted for an AMC. Variables covered demographics, diabetes characteristics, presentation, precipitants, management, and short-term outcomes. ***Results:*** Among 141 eligible records, AMCs accounted for 1.8% of admissions. Mean age was 55 ± 15 years ; male-to-female ratio 1.27. Type 2 diabetes predominated (93.7%) ; duration <5 years in 53.1%. Fourteen percent were not on antidiabetic therapy; hypertension coexisted in 21.13%. The commonest presenting complaint was classic hyperglycaemic symptoms (polyuria–polydipsia) (28.4%). AMC types were isolated hyperglycaemia 62.4%, diabetic ketoacidosis 31.2%, and severe hypoglycaemia 6.4% ; in 21.27%, the AMC revealed previously undiagnosed diabetes. Principal precipitants were infection (34.75% ; with skin/soft-tissue sites in 48.9% of infections), drug-related causes (34%), and non-adherence (14%). Management yielded rapid stabilisation : 56% were observed for <24 hours, while 44% required admission (mean length of stay 2.1 ± 1.8 days). No in-hospital deaths occurred. ***Conclusions:*** In this referral emergency setting, AMCs represent a meaningful yet manageable burden and function as a barometer of diabetes care quality. Their frequency sometimes without an obvious trigger underscores gaps in screening, therapeutic education, and access to specialised care. These findings support strengthened prevention, standardised emergency department protocols, and system-level organisation of diabetes services.

Keywords: diabetes mellitus; acute metabolic complications; emergency department; Touba.

I. INTRODUCTION

Diabetes mellitus is one of the leading causes of chronic morbidity worldwide. The International Diabetes Federation (IDF) estimated that in 2024, 589 million people would be affected, a figure that could reach 853 million by 2050, a global increase of more than 45% [1]. This rapid progression particularly affects low- and middle-income countries, whose health systems are still insufficiently prepared to cope with the explosion in the diabetic burden.

In sub-Saharan Africa, the prevalence of diabetes is estimated at around 4.5%, the underdiagnosis rate exceeds 50% [2]. In Senegal, in 2024, the prevalence rate of diabetes is 4.2% (10.1% among 44-59 year olds and 5.74% among 60-69 year olds). However, this rate varies considerably depending on the region [3]. Data on acute metabolic complications remain limited. However, these often constitute the first circumstance of discovery of the disease [4].

Acute metabolic complications include diabetic ketoacidosis (DKA), hyperosmolar hyperglycemia

syndrome (HHS), and severe hypoglycemia. These conditions correspond to serious metabolic disorders resulting from absolute or relative insulin deficiency, associated with triggering factors such as infection, non-compliance, or drug-induced iatrogenicity. They constitute life-threatening emergencies, responsible for hospital mortality ranging from 5% to 20% depending on the context [5].

The study of acute metabolic complications is therefore essential for: assessing the quality of screening and monitoring of diabetic patients, identifying the main factors of decompensation, adapting management strategies in emergency structures and guiding public health policies.

Our work aimed to describe the frequency, clinical aspects and evolution of acute metabolic complications of diabetes in a Senegalese reference hospital center.

II. METHODS

The study was conducted at the Cheikh Ahmadoul Khadim National Hospital Center (CHNCAK) in Touba, a leading institution in the Baol region. The adult emergency department receives an average of 20,000 patients per year. This was a retrospective, descriptive, and analytical study conducted over 12 months (from January 1 to December 31, 2023).

The records of diabetic patients over 18 years of age, known or unknown, admitted for an acute metabolic complication, were included. Incomplete records and those of patients admitted for isolated chronic complications (diabetic foot, retinopathy, nephropathy), were excluded from the study. The variables studied were as follows:

- sociodemographic variables: age, sex, profession, marital status.
- clinical variables: type of diabetes, duration, treatment followed, reason for consultation.
- biological variables: blood sugar, ketone levels, ionogram (if available).
- complications: simple hyperglycemia, diabetic ketoacidosis (DKA), hypoglycemia, hyperosmolar hyperglycemic syndrome (HHS).
- triggering factors: infections, iatrogenesis, non-compliance, surgical stress.
- therapeutics: rehydration, insulin therapy, antibiotic therapy, electrolytic correction.
- evolving: length of stay, mortality, secondary complications.

Data were entered and analyzed using SPSS and Epi Info software. Results are expressed as means ± standard deviation for quantitative variables and as percentages for qualitative variables. 95% confidence intervals (95% CI) will be provided for major proportions.

III. RESULTS

1. Epidemiological profile

The hospital prevalence was 1.8% of admissions (141 cases analyzed out of 280). The mean age was 55 years ± 15 years, with extremes of 20–86 years. The sex ratio M/F was 1.27. The type of diabetes was known for 111 patients, including 93.7% T2D versus 6.3% T1D. The majority of patients, 75/141 (53.1%), had diabetes evolving for less than 5 years. These complications inaugurated diabetes in 21% of patients.

2. Clinical aspects

The main reasons for consultation were: cardinal syndrome in 28.4%, digestive disorders in 15% of patients and neurological disorders in 10%. Complications were as follows: simple hyperglycemia in 62.4% of cases, diabetic ketoacidosis in 31.2% of cases and severe hypoglycemia in 6.4% of cases. No cases of pure hyperosmolar coma were identified.

3. Triggering factors

The main factors of decompensation were:

- infections, i.e. 34.7%, of which skin and soft tissue infections represent 48.9% (see figure 1),
- drug-induced iatrogenesis in 34%,
- non-compliance with treatment in 14%
- and other causes (such as stress, surgery, and diet) in 5% of cases.

4. Support

The treatment administered included: intravenous rehydration for 89.3% of patients, insulin therapy in 86.5%, antibiotic therapy in 34.7% and potassium correction in 12% of patients.

5. Evolution

The outcome was generally favorable with 56% observation not exceeding 24 h and 44% hospitalization with a mean duration of 2.1 ± 1.8 days (see Figure 2). No deaths were recorded.

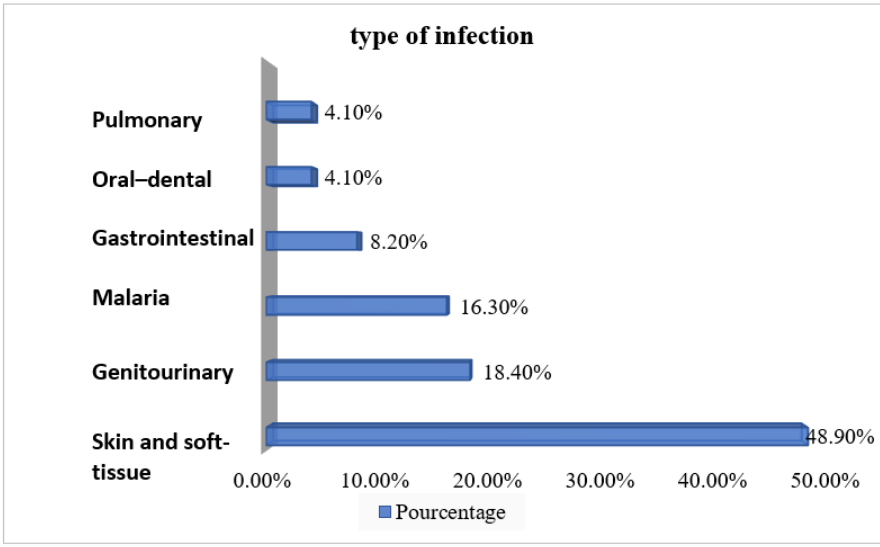

Figure 1: Distribution of patients according to the site of infection

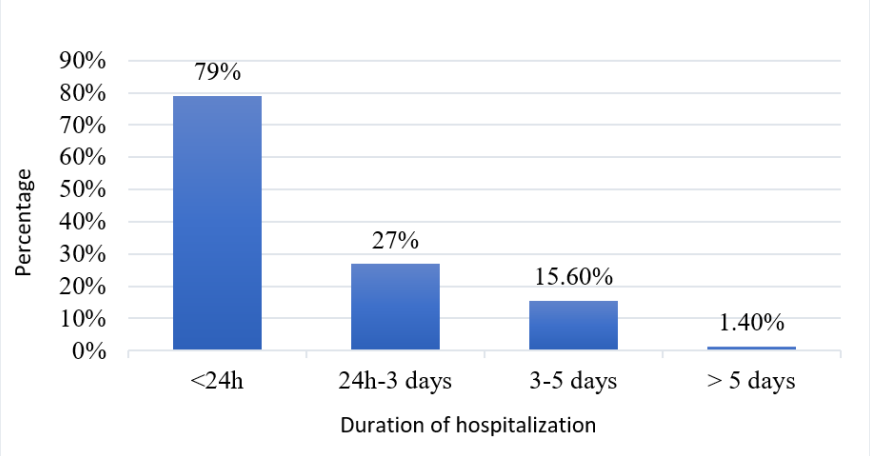

Figure 2: Distribution of patients according to length of hospitalization

IV. DISCUSSION

In our study conducted in the emergency department of the CHNCAK of Touba, acute metabolic complications of diabetes represented 1.8% of admissions, a rate relatively lower than those reported in other African settings, such as Wanvoegbe *et al.,* (19.9%) [6] or Balaka *et al.,* (23.3%) [7]. This difference could be explained by the youth of our hospital center, operational since 2022, but it also reflects the variability according to the structures, the populations served and the diagnostic capacities available.

Demographically, the average age of 55 places our patients in an advanced adult age group, consistent with the predominance of type 2 diabetes (93.7%). This profile is consistent with the data of Diédhiou *et al.,* in Senegal (96% T2D) [8] and Dionadji in Chad (89.6%) [9], confirming the burden of type 2 diabetes in middle-income countries. The significant proportion of new-onset diabetes (21%), however, highlights the importance of early detection, especially since the International Diabetes Federation (IDF) estimates that more than 70% of African diabetics are not diagnosed [1].

Infection emerged as the main factor of decompensation (34.7%), with a predominance of skin and soft tissue involvement. This finding is consistent with regional data, which indicate that infections represent between 50 and 70% of the causes of decompensation, due to functional immunosuppression induced by chronic hyperglycemia [6–8,10]. Iatrogenic (34%) and idiopathic (20%) causes complete this picture, demonstrating the difficulties linked to therapeutic education, adherence to treatment and continuity of follow-up.

Simple hyperglycemia was the most common complication (62.4%), followed by ketoacidosis (31.2%) and hypoglycemia (6.4%). These proportions differ from the series of Sow [11] *et al.,* and those from Ivory Coast or Benin, where ketoacidosis is largely dominant (up to 74%) [10,12]. This divergence could reflect a better responsiveness of patients in our context, with earlier management, before the onset of severe complications.

The overall outcome was favorable, with no deaths recorded and a short average length of hospital stay (2.1 days). These results contrast with the high mortality rates reported locally [11] and in some countries (up to 54% in Burkina Faso) [13]. The early treatment, the availability of basic resources and the predominance of pure hyperglycemic forms probably explain this favorable outcome.

However, our study has limitations inherent in its retrospective nature, including the uneven quality of the records and the absence of certain tests (blood gas, lactates). These constraints reduce diagnostic accuracy and international comparability.

Ultimately, our results confirm that acute metabolic complications of diabetes remain a significant burden in developing countries. Their frequency and severity reflect a lack of screening, structured monitoring, and therapeutic education. Strengthening primary and secondary prevention, improving access to care, and continuing education for patients and healthcare staff are priority areas for reducing the incidence and severity of these diabetic emergencies.

V. CONCLUSION

Acute metabolic complications of diabetes are a common cause of admission to the CHNCAK emergency department. They mainly concern type 2 diabetes, affect relatively young adults, and are dominated by simple hyperglycemia. Infection is the main triggering factor.

The favorable outcome without death in our series is encouraging, but should not obscure the need to improve screening, therapeutic education and access to specialized care.

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