

Infectious Complications of Diabetes at Ndamatou Hospital in Touba including a Population of 195 Cases Collected from January 2017 to December 2020

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Abstract

Introduction: Diabetes is a public health problem. It exposes to metabolic and chronic complications but also infectious ones. The latter can destabilize diabetes and increase morbidity and mortality. This prompted us to carry out this study, the objective of which is to describe the infectious complications of diabetes in the department of internal medicine and medical specialties of Ndamatou Hospital in Touba Senegal, Diourbel region.

Patients and methods: This is a descriptive and analytical cross-sectional study of diabetic subjects hospitalized with an infection over a four-year period from January 2017 to December 2020.

Results: During the study period, 439 patients were hospitalized for diabetes. Of these patients, 195 diabetics had an infection, a frequency of 44.42%. The mean age was 52.10 years. The age group 60-69 was the most represented with 26.9%. There were 114 women (58.5%), i.e., a sex ratio (m/f) of 0.71. Most patients came from Touba with 151 cases (77.5%). Type 2 diabetes was predominantly represented with 82.1%. Fifty-four (54) patients, i.e., 27.7%, had inaugural diabetes. Most patients had diabetes for less than 5 years (73 cases, 37.4%). The average length of hospitalization was 5.66 days with extremes of 1 to 31 days. Ketoacidosis was noted in 126 patients (64.6%), hyperglycemia in 55 patients (28.2%), hyperosmolar imbalance in 3 patients 6 (3.1%) and hypoglycemia in 2 cases (1%). The most frequent infections were cutaneous 45.7% (n=89), followed by urogenital 19.5% (n=49) and respiratory 19.5% (n=38). Abscesses predominated in skin infections 57.3% followed by diabetic feet 30.4%. The average consultation time was 8.26 days with extremes ranging from 1 to 31 days. 28 patients (14.4%) were consulted after 15 days. The case fatality rate was 5.1% (n=10).

Conclusion: Infectious complications in diabetes are not trivial. Therapeutic education is essential for a more effective and efficient prevention and a reduction of mortality.

Keywords: Diabetes • Infection • Complications • Ndamatou Hospital • Senegal

Introduction

Because of its prevalence, medical, social, and economic impact, diabetes is classified as a public health problem [1]. It is the fourth or fifth leading cause of death in most high-income countries. According to the latest WHO estimates, 552 million people worldwide will have diabetes by 2030 [2]. Type 2 diabetes primarily affects 300 million people or 6.6% of the adult population [3]. By 2030, Sub-Saharan Africa is expected to have 23.9 million adults with diabetes mellitus [2]. In Senegal, there is no exact data on national prevalence. Statistics come from hospital studies. Diabetes is related to several types of complications that make it so serious [3]. One of these

complications is infection, which in some cases reveal the disease. In fact, chronic hyperglycemia causes alterations in the various tissues of the body, making them fragile and sensitive to infection, as well as in the factors involved in anti-infectious defense [4,5]. The objective of this study was to describe the epidemiological, clinical, biological, and evolutionary profiles of infections in patients hospitalized for diabetes at the Department of Internal Medicine of Ndamatou Hospital in Touba.

Materials and Methods

Study framework

Our study took place in Touba, a city located at 193 km from Dakar, 47 km from Diourbel and 7 km from Mbacké. It covers an area of approximately 552.92 km² with an estimated population of 854,667 inhabitants. The Touba Ndamatou Health Centre was established as a District in 1990 and later as an EPSH1 in 2010. It is a reference centre with 95 hospital beds out of a theoretical capacity of 81, including 17 beds for medicine. It has a laboratory, a department of radiology and a pharmacy. Its personnel are composed as follows: twenty-eight doctors, including thirteen specialists, ten management executives, ten senior health technicians and six junior technicians, twenty midwives, thirty-seven nurses (20 state nurses and 17 nursing assistants), thirty-eight nursing assistants, twenty-five administrative agents.

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Type of study

This was a descriptive analytical cross-sectional study of diabetic subjects hospitalized for infection at the Ndamatou Hospital in Touba.

Study population

Our patients were recruited over four years, from January 2017 to December 2020. The study population consisted of known or newly diagnosed diabetic patients with an infectious pathology that motivated their admission to the hospital during the study period. The diagnosis of newly detected diabetes was made according to the classical criteria [6]. The diagnosis of infection was based on clinical, biological, and radiological criteria [7].

Data collection

A standard questionnaire was drafted to serve as the basis for data collection for patients included in the study. Anamnestic, clinical and paraclinical data were collected and included:

- **Socio-demographic characteristics:** Gender, age, age group, occupation, marital status, origin.
- **The study of diabetes mellitus:** Type of diabetes, duration, existence or not of cardiovascular risk factors (smoking, hypertension, obesity, dyslipidemia, age, alcoholism).
- **Clinical, para-clinical and evolutionary characteristics:** Weight, height, BMI, BP, T°, time to onset of symptoms, family history, blood glucose, CBC, creatinine, CRP, HbA1c, lipid profile, renal function, and micro albuminuria, ECG, electrocardiogram (ECG), and evolution under treatment.

Statistical analysis

The data were entered into Microsoft office Excel and analyzed using epi info 2000 version 3.3.2. Continuous variables were described as median and interquartile range, categorical variables as percentage to describe the sociodemographic, clinical and biological characteristics of the population. The characteristics of the analysis population were compared using the Chi-2 test (categorical variables) or the Kruskal-Wallis test (continuous variables).

Ethical considerations

The analysis involved anonymised data and therefore did not contain the exact identity or address of individuals.

Results

Socio-demographic characteristics

During the study period we selected 439 diabetic patients hospitalized in the medical ward. Of these (195) representing (44.4%) had an infection and were included in the study. The mean age was 52.10 ± 16.35 years with extremes of 16 and 92 years. The age group 60-69 was the most represented 26.2%. Subjects under 30 years of age represented 10.3%. There were 114 women (58.5%) and 81 men (41.5%), i.e. a sex ratio (m/f) of 0.71. Most patients came from Touba with 155 cases (79.5%).

Clinical and paraclinical

The average length of hospitalization was 5.66 days with extremes of 1 to 31 days. Most patients had a hospital stay of less than 7 days, with 144 (73.9%). Type 2 diabetes was predominantly represented with 160 cases (82.1%). Fifty-four (54) patients, i.e. 27.7%, had inaugural diabetes. Most of the recruited patients had diabetes for less than 5 years (73 cases, 37.4%). A family history of diabetes was noted in 150 patients (76.92%). A medical history was noted in 99 patients (50.8%). Ketoacidosis was noted in 126 patients (64.6%). 6 patients (3.1%) had hyperosmolar imbalance. HTA was noted in 76 patients (39%), obesity in 7 patients (3.6%) and smoking in 9 patients (4.6%). Dyslipidemia was present in 11 patients (5.6%). The average consultation time was 8.26 days with extremes ranging from 1 to 31 days. 28 patients (14.4%) were seen after 15 days. Weight loss was found

in 18 subjects (9.2% of cases). Polyuria was present in 40 people, i.e. 20.5% of cases, and polydipsia in 40 people, i.e. 20.5%. Altered consciousness was present in 22 patients (11.3% of cases). The capillary blood sugar level varied between 0.36 g/l and 5.96 g/l with an average of 3.45 g/L. The mean weight of the patients was 66.74 ± 21.04 kilograms with extremes of 29 and 127 kilograms. The minimum BMI was 14.0 ± 6.53 kg/m², the maximum was 40.35 kg/m² and the mean was 23.86 kg/m². Obesity was found in 15.9% of the population (31 patients). Overweight was found in 32.3% or 63 patients. Table 1 shows the characteristics of the patients.

Therapeutic

Eighty-three (83) patients were on insulin, i.e. 42.6%, eighty-one (81) patients on oral antidiabetics, i.e. 41.5%. One hundred and seventy-two (172) patients were on antibiotics (88.2%). Antihypertensive drugs were used in 63 patients (32.3%). Lipid-lowering drugs, particularly statins, were prescribed for 23 patients (11.8%). Anti-platelet agents with Aspirin 100mg were prescribed in 13 patients or 6.7%. Anticoagulants were prescribed in 73 patients (37.4%). Ten patients died, all of whom were type 2 diabetics (5.1%). Of the deaths recorded, 90.0% were under 60 years of age.

Limitations of the study

The main limitation in our study is the fact that data collection was not exhaustive.

Discussion

Infectious complications are an important cause of morbidity and mortality within the Department of internal medicine t of Ndamatou Hospital in Touba. The frequency (44.42%) of infectious complications is high among diabetic patients. This is far from being negligible. In the literature, several authors found a higher frequency of infections in diabetics than in non-diabetics [8].

Table 1. Characteristics of included patients (n=195).

| Work Force | Number n=195 | Percentage |
|---|---------------------|------------|
| Age, average, years | 52.10 ± 16.35 years | |
| Sex (% female) ** | 114 | 58.5 |
| Geographical origin %*** | | |
| Dakar | 2 | 1.0 |
| Linguere | 8 | 4.1 |
| Mbacké | 28 | 14.4 |
| Touba | 155 | 79.5 |
| Other locations | 2 | 1.0 |
| Family history of diabetes | 150 | 76.92 |
| Age of diabetes, years | | |
| >1 year | 54 | 27.7 |
| 1-5 | 73 | 37.4 |
| 6-10 | 41 | 21.0 |
| >10 | 27 | 13.9 |
| Consultation period days | | |
| <7 | 99 | 50.7 |
| 7-14 | 68 | 34.9 |
| > 15 | 28 | 14.4 |
| Length of stay days | | |
| <7 | 144 | 73.9 |
| 7-14 | 49 | 25.1 |
| >15 | 2 | 1.0 |
| Body Mass Index (BMI) Kg/m ² | | |
| < 18.5 | 47 | 24.1 |
| 18.5-24.9 | 54 | 27.7 |
| 25-29.9 | 31 | 15.9 |
| >30 | 63 | 32.3 |
| Average capillary blood glucose g/l | 3.45 | - |
| Type 2 diabetes | 160 | 82.1 |

These results are like those found by other African authors. In Senegal, Sow D, et al. [9] found 58.78%, Sarr 78% and Boutabia in Algeria 51.7% in their series [9-11]. It is higher than those found by Donadji, Raheison R.E. and al. and Abduelkarem A.R. & al, which were respectively 3.98%, 18.3% and 18.8% [12-14].

The mean age was 51.60 ±16.52. This result is comparable to those found by other authors in Africa, like Sow and Masoodi's team who found respectively and 56,1750, 5years [9-15]. On the other hand, in France, the average age of 64 years of diabetic patients was higher [16].

Infection continues to be one of the revealing complications of diabetes, like in Uganda [17]. This delay in diagnosis is mainly related to ignorance due to lack of information on screening and symptoms of diabetes and to social precariousness [18]. In addition, other factors such as the primary reliance on traditional healers and the geographical inaccessibility of health facilities are barriers to early detection and management [18].

In diabetics already known before their admission, the average duration of diabetes evolution found in our study was superimposed on that reported by the Masoodi team (6.6 ± 5.6 years) and Madagascar 6.69 years [9-19]. This corresponds roughly to the average time for the appearance of degenerative complications of diabetes [20], particularly microvascular complications, which would favor the occurrence of infections [9].

The average hospital stay of 5.66 days is close to the results found by Agbodande KA [21], in Benin with an average of 7 days. The average length of hospitalization of our patients was between those reported by the team of Mokhtar and Rachidi which were respectively 1020 days [23,24]. On the other hand, Mossi in Lomé had a longer average length of stay of 26.37 ± 7.2 days with extremes of 4 days and 96 days [22]. Infections in diabetics always increase the economic and hospital costs by prolonging the hospital stay. The predominance of infection was also found in the series by Pouye A, et al. [25] and Lokrou A, et al [26] in proportions of 83.2% and 37.8% respectively. In a study in Madagascar, the prevalence of infection as a reason for hospitalization was 18.30% [19].

Skin, urogenital, and respiratory infections were the most common with 45.7%, 25.1% and 19.5% respectively. In the study of Lèye et al, the predominant infectious location was urogenital (38.23%) [27]. Also, Sarr A, et al. [10] and Umpierrez GE and Kitabchi AE [28] found a predominance of urogenital and bronchopulmonary infections. Sow D, et al [9] found a prevalence of infections of 50% dominated by skin and soft tissue infections (54.9%), urogenital infections (16.2%) and respiratory infections (14.4%). For skin infections, they are generally common in diabetics. However, in our study, abscesses came first, followed by diabetic feet. In our practice, diabetic foot

infections were the most frequent. The hypotheses of a particularity of microbial flora, climate, lifestyle, or negligence have been put forward by Akossou, et al. to explain this high frequency of diabetic foot infections [18]. These lesions can lead to amputations, hence the need for good therapeutic education of patients. Of the respiratory infections, those affecting the lower respiratory tract predominated over those affecting the upper respiratory tract. Indeed, the duration of diabetes, its complications, and poor long-term glycaemic control increase this risk [29].

In the literature, several authors found a higher frequency of infections in diabetics compared to non-diabetics [9,30]. Case fatality was 5.1% (n=10) in patients hospitalized for diabetes with confirmed infection. Mortality statistics for diabetes are scarce in Africa and generally fragmentary. In Ethiopia, the mortality rate is estimated to be 31-32% and is mainly due to ketoacidosis and infections. The in-hospital mortality rate of 22.8% (10/439) was higher than in other studies and varied between authors. It was 9.9%; 16.4%; 15% and 18.5% respectively in the work of Abduelkarem A.R, et al. [12] and Dionadji M, et al. [13] (Table 2) [30,31].

Conclusion

Infections are a frequent reason for hospitalization among diabetics in Touba. They reveal diabetes in almost one third of cases. Skin infections are the most frequent, followed by urinary and respiratory infections. Patient education must be strengthened and integrated into overall diabetes management strategies for a better prevention of infectious risks.

Conflicts of Interest

The authors certify that they have no affiliation with or involvement in any organisation or entity with a non-financial interest or stake in the subject matter of this manuscript. The authors did not receive any specific funding for this work.

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Table 2. Distribution of patients by focus and nature of infection (n=195).

| Main Infections Found | Work Force | Percentage (%) |
|--------------------------|------------|----------------|
| Skin infections | 89 | 45.7 |
| Abscess | 51 | 26.1 |
| Diabetic foot | 27 | 13.8 |
| Erysipelas | 9 | 4.6 |
| Pressure sores | 1 | 0.5 |
| Burn | 1 | 0.5 |
| Urogenital infections | 49 | 25.1 |
| Cystitis | 26 | 13.3 |
| Vulvovaginitis | 13 | 6.7 |
| Acute pyelonephritis | 10 | 5.1 |
| Respiratory infections | 38 | 19.5 |
| Common germ lung disease | 25 | 12.8 |
| Pulmonary tuberculosis | 7 | 3.6 |
| Covid-19 | 4 | 2.0 |
| Purulent pleurisy | 1 | 0.5 |
| Angina | 1 | 0.5 |
| Other | 19 | 9.7 |

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