

RESEARCH ON THE COMMON INFECTIONS IN DIABETIC PATIENTS

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Abstract: Numerous clinical studies show that morbidity due to infections is higher in diabetics. Our study included 429 patients with diabetes mellitus, who also presented infections with different localizations. The most frequent were the urinary tract infections, followed by bacteriemia, soft tissue infections and pneumonia, with more reduced frequencies. The etiological spectrum of the urinary tract infections was dominated by *E. coli* (70,8 %), followed by *Enterobacter sp.* (19,5 %) and *Proteus sp.* (4,7 %). There have been involved, in a smaller percentage, other Gram negative germs, Gram positive cocci and yeasts. The most common germ involved in the systemic and soft tissue infections was *S. aureus*, followed by the germs of the *Enterobacteriaceae* family.

Keywords: infections, diabetes mellitus

Rezumat: Numeroase studii clinice arată că morbiditatea prin infecții este mai crescută la diabetici. Studiul nostru a inclus 429 de pacienți cu diabet zaharat care au prezentat și infecții cu diferite localizări. Cele mai frecvente au fost infecțiile tractului urinar, urmate, cu frecvențe mult mai mici de bacteriemii, infecții ale țesuturilor moi și pneumonii. Spectrul etiologic al infecțiilor urinare a fost dominat de *E. Coli* (70,8 %), urmată de *Enterobacter sp.* (19,5 %) și *Proteus sp.* (4,7 %). Au fost implicați, în proporții mai reduse, alți bacili Gram negativi, coci Gram pozitivi și levuri. În producerea infecțiilor sistemice și ale țesuturilor moi, mai des implicat a fost *S. aureus*, urmat de germeni din familia *Enterobacteriaceae*.

Cuvinte cheie: infecții, diabet zaharat

estimated to take place in the next years at international level, especially in the developing countries, due to the significant changes of the population's lifestyle.

Nowadays, the specialised literature unanimously accepts that morbidity due to infections is higher in diabetics. The relation between diabetes mellitus and tuberculosis has been known for more than one thousand years. Numerous clinical studies prove that this category of patients is predisposed to infections and their occurrence complicates the control of diabetes. It is considered that the diabetic patients' increased sensitivity to infectious is multifactorial. In case of diabetes type I, the genetic predisposition to infections is taken into consideration. In the WHO classification, diabetes is considered a secondary immunodeficiency.

The increase of the blood glucose level is correlated to the alteration of certain defence mechanisms of the body. Hyperglycemia leads to the alteration of neutrophils and macrophage functions. Mobilization and chemotaxy are affected, as well as the phagocytosis process. The decrease of G and A immunoglobulins production was noticed, as well as alterations of certain subpopulations of T lymphocytes, the quantitative and functional reduction of certain components of the complement. The vascular and nervous affection and the increased level of glycaemia decrease the tissue irrigation and reduce the antibiotics' absorption, stimulating the bacterial proliferation. At its turn, the infection unbalances glycaemia and precipitates ketoacidosis.

The evolution of infections in the patients suffering from diabetes mellitus is more severe, even culminant. Urinary infections are more frequent and raise treatment problems. The strongest infections are the pulmonary infections and the necrotizing fasciitis detected in the same patients. Certain severe infections (invasive external otitis, mucormycoses, cholecystitis or emphysematous pyelonephritis) were described only in diabetic patients.

PURPOSE OF THE RESEARCH

The purpose of the study is to identify the incidence and the type of the infections at diabetics.

MATERIAL AND METHOD

The retrospective study we have accomplished included diabetic patients who also presented infections

INTRODUCTION

Diabetes mellitus is a current issue for the medical world. The disease is spread all over the world, but it is the most frequent in the developed countries. In the U.S.A., 6,3% of the population suffers from this chronic affection and it is estimated that more than 2% of the Americans have not been diagnosed yet. In Europe, according to the statistics of the World Health Organization and to the International Diabetes Federation, the disease prevalence is of 7,8 %. The disease prevalence is higher in men, but the number of women also remains increased.

Regarding our country, the prevalence is higher, of 9,3 %, according to the same sources. Also, the number of the sick persons still undetected is estimated to be very high. A rapid increase of the incidence of this affection is

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with different localizations. The study batch was made up of patients who required hospitalization in the section of Diabetes and Nutrition Diseases within the Clinical County Emergency Hospital Braşov, within a period of 2 years.

The microbial strains etiologically involved in the infections of these patients were isolated and afterwards identified in the clinical laboratory of the above-mentioned medical unit.

The objectives of the study consisted in the evaluation of the types of infections occurred in the patients suffering from diabetes mellitus, as well as their etiologic aspect.

RESULTS AND DISCUSSIONS

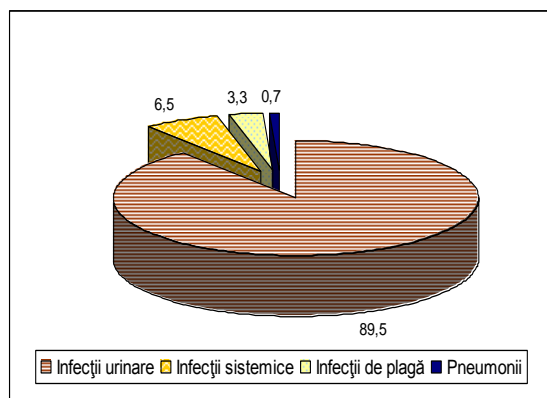
The number of the infections identified during those 2 years of study was relatively constant (226 cases during the first year and 203 cases during the second one). Initially, we analyzed the types of infections detected in the studied patients, the way it resulted from table 1.

Table no. 1. Types of strains

Product	Urine	Blood	Wounds secretion	Sputum
No. of strains	384	28	14	3

Picture no. 1 shows the graphic representation of the results obtained:

Picture no. 1. Weight of the infections with different localizations



The analysis of the above-mentioned picture reveals that on the first place, in terms of frequency, there were the urinary infections, followed by bacteriemia, infections of the soft tissues and pneumonias.

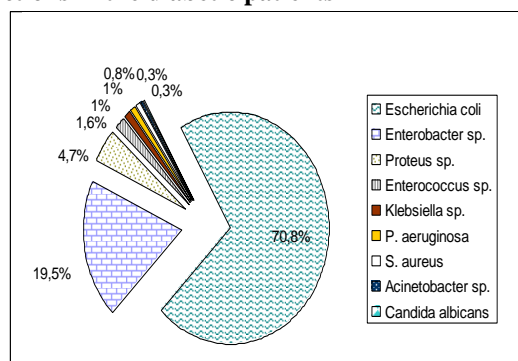
Another objective of the accomplished study was the evaluation of the etiologic spectrum of the infections in the hospitalized diabetic patients.

We analysed this aspect in the case of the infections of the urinary tract, which formed the majority of cases in the conditions of the studied batch. The results obtained were graphically represented in picture no. 2:

The analysis of the above-mentioned picture emphasises the diversity of the germs involved in the etiology of the urinary infections in the hospitalized diabetic

patients. The etiologic spectrum was dominated by *E. coli* (70,8 %), followed by the germs of the *Enterobacter*. (19,5 %) and *Proteus* families (4,7 %).

Picture no. 2. Etiological spectrum of the urinary infections in the diabetic patients



The above data reveal that 6,5 % of the diabetic patients that associated infections during the studied period of time recorded systemic disseminations, 3,4 % presented infections of the soft parts at abdominal level or of the lower limbs and 0,7% acquired bacterial pneumonias.

Regarding these categories of infections, detected in the patients suffering from diabetes mellitus included in our study, the results are presented in the table 2 below:

Table no. 2. Types of germs identified in strains

Isolated germs	Blood	Wound secretions	Sputum	Total
<i>Staphylococcus aureus</i>	10	7	1	18
<i>Enterobacter sp.</i>	9	3	2	14
<i>Escherichia coli</i>	7	1	-	8
<i>Staphylococci coagulate-negatively (SCN)</i>	-	3	-	3
<i>Proteus sp.</i>	1	-	-	1
<i>Enterococcus sp.</i>	1	-	-	1
Total	28	14	3	45

Both, in the case of systemic infections and the infections of the soft tissues, the species of *Staphylococcus aureus* was more often involved, followed by the germs of the *Enterobacteriaceae* family.

CONCLUSIONS

- The study revealed the fact that the more frequent infections in the diabetic patients were the infections of the urinary tract, followed by bacteriemia, infections of the soft tissues and pneumonias, but with reduced frequencies.
- The etiologic spectrum of the urinary tract infections was dominated by *E. coli* (70,8 %), followed by *Enterobacter sp.* (19,5 %) and *Proteus sp.* (4,7 %). There have been involved, in a smaller percentage, other Gram negative germs, Gram positive cocci and yeasts.

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3. Regarding the production of the systemic infections and of the soft tissues, the most often involved factor was *S. aureus*, followed by the germs of the Enterobacteriaceae family.
4. Pneumonias in the diabetic patients were rare in the conditions of our study and were brought about by *Staphylococcus aureus* and *Enterobacter* sp.

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