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Bacteriological profile of the nasopharynx in patients with type 2 diabetes

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Abstract

Introduction. Caring for people with diabetes is a challenge for doctors. GPs should be diagnostically vigilant and pay attention even to unusual symptoms reported by the patient, as they can progress quickly, impeding effective treatment. Targeted treatment of the bacteriological infection improves the prognosis in this group of patients. Its condition is to perform bacteriological tests. Statistics show that the infectious flora differ between people with diabetes and the general population.

Objective. The aim of the study was to evaluate in a group of patients with type 2 diabetes without symptoms of active infection, the following: 1) composition of microflora in the nasal cavity and throat, with particular emphasis on the frequency and type of opportunistic and pathogenic microorganisms; 2) carrier status of Staphylococcus aureus bacteria in the nose, and its relationship to diabetes control/ other comorbidities predisposing to immuno-suppression.

Materials and method. The study included 88 patients diagnosed with type 2 diabetes who were interviewed in the form of a questionnaire. Patients with additional systemic diseases and taking antibiotics within the last 6 weeks were excluded from the study. Microbiological tests required the collection of nasal and throat swabs from all enrolled patients.

Results. The bacteriological analysis included 176 nasal and throat swabs taken from 88 patients with type 2 diabetes. A total of 627 species of microorganisms were identified, and 90 potentially pathogenic strains present in the nasal cavity and throat of the subjects were isolated and identified.

Conclusions. People with type 2 diabetes who do not show symptoms of infection are often carriers of potentially pathogenic bacteria in the nasopharynx.

Key words

type 2 diabetes mellitus, family doctor, nasopharynx, carrier status

INTRODUCTION

The human organism is inhabited by many different microorganisms which include bacteria, archea and eukaryotes, both commensal and symbiotic, and pathogenic. The composition of the microbiome depends on gender and age, and changes under the influence of various factors, including diet and medications [1]. Recent studies have proven the importance of microbiome both in physiology and in various disease states of the organism [2]. There is substantial data indicating the existence of a disturbed microflora composition, e.g. intestines in metabolic diseases such as obesity and diabetes [3, 4]. This is considered to be of significant clinical importance at both the local and systemic levels. The altered microbiome disrupts the local protective functions of the epithelium and promotes infestation with pathogenic microorganisms. The adverse local effects of changes in the composition of the microbiome include susceptibility to infections, e.g. inflammation of the respiratory tract. The microbiome of the upper respiratory tract plays a role in the development of local and systemic disease [2, 5], but it is unclear which pathogens are of particular importance in patients with diabetes [6].

Numerous opportunistic pathogens are present on the mucous membranes although they are of little significance under normal physiological conditions and with normal immune functioning [1, 7, 8, 9]. These include *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*. The presence of these bacteria, which are harmless to the organism, is called colonization, and bacteria – commensal flora. Interruption of this balance and subsequent bacterial infection and disease may be caused by a decrease in the local immunity by, e.g. trauma or due to a decline in overall immunity caused by the presence of systemic metabolic disorders, such as uremia, liver dysfunction or diabetes [10, 11, 12].

Epidemiological analyses confirm that infectious diseases occur much more frequently in patients with diabetes than in the general population [13, 14]. The course of the disease

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is generally more severe and diabetic patients are at greater risk of complications and premature death. Hyperglycaemia underlies the pathophysiology of increased infection risk in diabetic patients, both at a cellular level due to disrupted endothelium function, cellular immunity, humoral immunity, and the antioxidant system and at the system level due to end-organ damage resulting from micro- and macroangiopathy [15, 16, 17, 18]. It is therefore important to implement effective preventive and therapeutic measures aimed at early and effective treatment of infections in this cohort of patients.

Caring for patients with diabetes is a challenge for doctors in both primary and secondary care. Special care needs to be taken with this group of patients due their atypical presentation, rapid progression and high risk of developing complications. Primary care physicians need to be alert to minor or unusual symptoms reported by the patient, and treat them with a high index of suspicion as they may deterioriate rapidly. Early, targeted treatment improves the prognosis in this group of patients and is dependent upon bacterial culture. The infectious flora differs between diabetic patients and the general population. Among the former, opportunistic infections and infections with atypical microorganisms, including fungi, are observed to a greater degree.

OBJECTIVE

The aim of this study was to assess the following parameters in a group of patients with type 2 diabetes without symptoms of active infection: 1) composition of the microflora in the nasal cavity and pharynx, with particular emphasis on the frequency and type of opportunistic and pathogenic microorganisms; 2) carrier status of Staphylococcus aureus bacteria in the nose and its relationship to diabetes control/ other comorbidities predisposing to immuno-suppression

MATERIALS AND METHOD

The study was approved by the Bioethical Committee of the Medical University of Silesia in Katowice *(Resolution No. KNW / 0022 / KB1 / 117/14 of 14.10.2014).* Under the supervision of a family doctor, 88 patients (62%) from a total of 140 on a list of patients diagnosed with type 2 diabetes, were qualified for the study, regardless of duration and severity of the disease, and treatment methods. The study excluded patients with type 2 diabetes who had an acute respiratory infection, had taken antibiotics in the past six weeks, and had suffered from chronic respiratory diseases, such as chronic obstructive pulmonary disease, bronchiectasis, cystic fibrosis, bronchiolar disease, allergic rhinitis, nasal polyps and smoked cigarettes. All patients obtained comprehensive information on the aims and methodology of the study and gave written consent to participate.

The study protocol included three educational visits nine weeks apart, and one final-summing-up visit 10 weeks after the third visit (all visits were planned every nine weeks, the last summarizing visit was several days delayed, hence the interval between the third and fourth visit was 10 weeks) (Fig. 1). During the educational visits, it was assessed whether the patient uses the glucose meter correctly – the technique of measuring blood glucose with a glucometer was assessed, the diary of self-monitoring of glycaemic measurements was checked, patients were made aware of the importance of diet, physical activity, foot care, and were informed about how to deal with hypoglycaemia. At the fourth and last visit, anthropometric measurements were taken, a physical examination performed to exclude respiratory infections, throat and nose swabs were taken, and a venous blood sample obtained for laboratory tests.

At the last visit with the patients, an interview was also conducted in the form of a questionnaire which concerned, among others: drugs used in anti-diabetic therapy, comorbidities, disease duration, age and gender of the patient (Appendix 1). The data from the questionnaire was verified with the patient's medical documentation which was in the possession of the general practitioner.

Anthropometric tests included measurement of blood pressure, waist circumference, body weight and BMI assessment. Venous blood samples were analyzed for blood count, glycated haemoglobin HbA1c, transaminase, lipid profile, serum creatinine, uric acid, fasting blood glucose and two hours after a meal.

Based on the medical records of patients, the history of chronic and past diseases was analyzed, including the occurrence of arterial hypertension, coronary artery disease, chronic liver and kidney diseases, gastroesophageal reflux and allergies. The presence of dentures was noted.

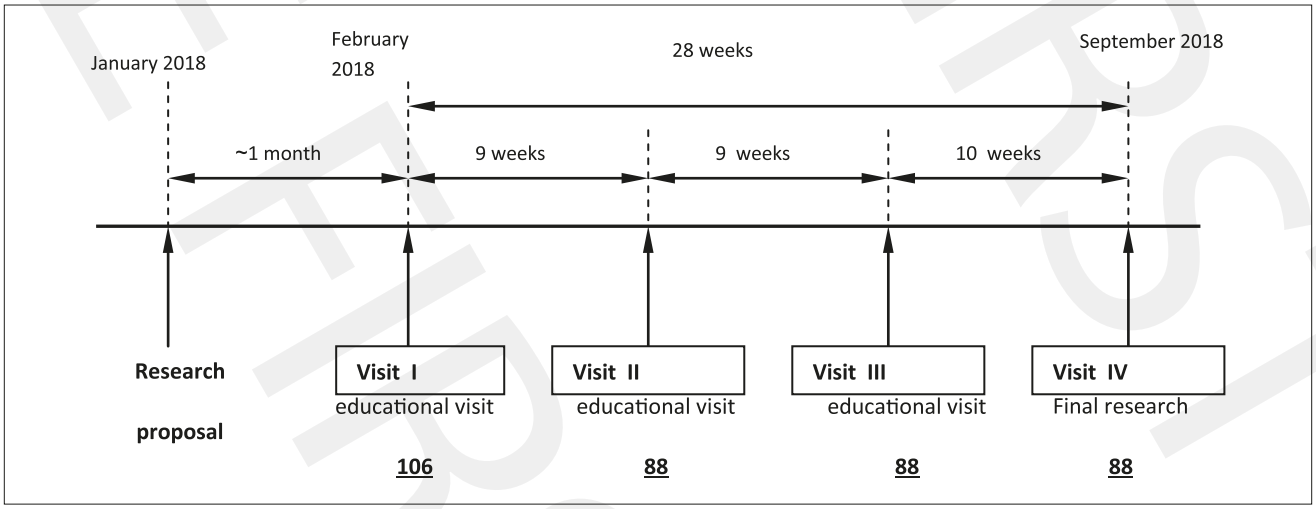

Figure 1. Scheme of organization of study of patients with type 2 diabetes

Throat and nose swabs were collected using sterile swabs and placed in a transport medium for aerobic and anaerobic microorganisms. The secured material was subjected to microbiological analysis, including bacteriological and mycological examination for Candida albicans infection.

Material collected from patients was inoculated onto appropriate culture media in order to multiply and isolate pure microbial cultures. The aerobic bacteria were grown on Columbia Agar solid medium with 5% sheep blood at 37 °C. Anaerobic bacteria were grown on solid Schaedler K3 medium, with the addition of 5% sheep blood at 37 °C in anaerobic conditions, obtained using Genbag anaer kits (Biomerieux, Marcy l'Etoile, France). Fungi of the genus Candida were grown and initially identified using the chromogenic substrate ChromID Candida (Biomerieux, Marcy l'Etoile, France).

After 24 hours, the culture was assessed. Potentially pathogenic colonies were isolated on new media in order to obtain pure culture, from which identification was performed after another 24 hours. The following sets of reagents were used: ENTEROtest 24 N, NEFERMtest 24 N, STREPTOtest 24, STAPHYtest 24, ANAEROtest 23, OXItest, PYRAtest, and the computer programme TNW_lite 6.5 (Erba-Lachema, Brno, Czech Republic) for identification of the species of microorganism. BIOMERIEUX tests (Marcy L'Etoile, France) were used to identify biochemical features: Katalaza, Slidex Staph Kit, API Candida. Reading and interpretation of test results was performed according to the recommendations of the manufacturers of the diagnostic reagent kits.

Microbiological tests were performed in the Microbiological Laboratory of the Chair and Department of Microbiology and Immunology of the Medical University of Silesia in Zabrze, entered on the list of the National Chamber of Laboratory Diagnosticians.

Statistical analysis. Statistical analysis was performed using the Statistica 12.5 programme. The results obtained are presented as mean, standard deviation, median and quartile values. After the sample distribution was determined by the Kolmogorov-Smirnov test, the one-way analysis of variance (ANOVA) test was used to compare the data with a normal distribution, and the Mann-Whitney test for data with a non-normal distribution. The RIR Tukey test was used in the *post-hoc* analysis. The numbers in the study groups were compared with the Pearson Chi-square test with the Yates correction. The results of tests and statistical analyzes for which the significance level p was ≤ 0.05 were considered statistically significant.

RESULTS

The study group consisted of 88 people: 69 women and 19 men, with an average age of 66 years, suffering from type 2 diabetes for an average of 10.8 years (SD +/- 9.4). 35.2% of patients were treated with insulin, 76% with oral hypoglycaemic drugs, and 1% with diet alone. The degree of diabetes control over the last three months was measured using glycated haemoglobin (HbA1c, expressed as a percentage); the average of which in this study group was 6.9%.

Bacteriological analysis included 176 nasal and throat swabs collected from 88 patients with type 2 diabetes. A total of 627 species of microorganisms were identified. 90 potentially pathogenic strains present in the nasal cavity and throat of the subjects were isolated and identified.

1) **Frequency of species of pathogenic bacteria in the nasal cavity.** Physiological nasal cavity flora was found in only 12% of the examined patients with diabetes. The carriage of potentially pathogenic microorganisms was found in 88% of patients, with *Staphylococcus epidermidis MSCNS* (31%) and *Staphylococcus aureus MSSA* (18%) predominating. In the remaining percentage, seven other pathogenic species were isolated: *Staphylococcus epidermidis MRCNS* (22.1%), *Staphylococcus haemolyticus MSCNS* (19.5%), *Staphylococcus haemolyticus MRCNS* (3.9%), *Proteus mirabilis ESBL* (-) (2.6%) and *Escherichia coli ESBL* (-), *Moraxella catharralis, Staphylococcus* warneri, and MSCNS, with a total frequency of 1.3%.

2) **Prevalence of species of pathogenic bacteria in the throat.** In 20.5% (n = 18) of the subjects, 14 potentially pathogenic microorganisms were found in swabs taken from the throat. Of the 14 isolated species, *Staphylococcus haemolyticus MSCNS* was the most common (3.3%). Subsequently, in 2.2% of people the following was found: *Staphylococcus aureus MSSA, Escherichia coli ESBL* (-), *Enterobacter cloacae ESBL* (-), *Klebsiella oxytoca ESBL* (-) and *Klebsiella pneumoniae ESBL* (-). Other pathogenic species isolated from the throat (each in 1.1% of patients) are: *Burkholderia cepacia ESBL* (-), *Citrobacter freundii ESBL*

Table 1. Characteristics of the studied group

	Mean	Median	Minimum	Maximum	Lower quartile	Top quartile	Deviation standard
Age (years)	66.02	67	25	88	60	74	11.74
BMI (kg/m^2)	30.87	30.5	19.6	44.4	27.6	33.6	4.836
waist / hip ratio WHR	0.91	0.92	0.63	1.08	0.88	0.96	0.079
leukocytes (10^3/µl)	7.5	7.16	3.18	23.8	6.04	8.52	2.65
haemoglobin (g/dl)	13.36	13.4	9.21	17.9	12.45	14.35	1.64
fasting glucose (mg/dl)	135.47	126.85	64	335.6	99	156.35	48.42
postprandial glycaemia	161.26	148	76	298	129.5	186.5	43.85
HbA1c (%)	6.89	6.8	5.4	10.79	6.1	7.4	1.05
uric acid (mg/dl)	5.46	5.25	2.47	16.8	4.58	6.03	1.68
total cholesterol (mg/dl)	207.54	200.25	86.7	340.5	178.7	232.55	47.58
Alat (U/l)	71.85	49	20	326	38	88	55.14

(-), *Enterobacter aerogenes ESBL* (-), *Proteus mirabilis ESBL* (-), *Stenotrophomonas maltofilia ESBL* (-), *Streptococcus B-haemolyticus gr. B, Streptococcus B-haemolyticus gr. C, Streptococcus pneumoniae.*

3) Comparison of the frequency of occurrence of selected species of pathogenic bacteria in the nasal cavity and in the throat. There was a significant difference in the presence of *Staphylococcus aureus MSSA* (P = 0.0001) and *Staphylococcus haemolyticus MSCNS* (P = 0.006) in the nose and throat (Table 2).

The applied test of independence $\chi 2$ with Yates's correction, assessing the colonization relationship between the nose and throat, showed that *Staphylococcus aureus MSSA* and *Staphylococcus haemolyticus MSCNS* isolated from the nose had no effect on the throat colonization in the studied patients.

There were no significant differences in the frequency *of Escherichia coli ESBL* (-) and *Proteus mirabilis ESBL* (-) in nasal and throat swabs in patients with type 2 diabetes.

Table 2. Analysis of the relationship between the presence of selected species of bacteria in throat swabs in patients with type 2 diabetes

Isolated pathogens	Nose (n)	Throat (n)	χ^2	p
Staphylococcus aureus MSSA	18	1	15.10	0.0001
Staphylococcus haemolyticus MSCNS	15	3	7.49	0.06
Escherichia coli ESBL (-)	1	2	0.34	0.56
Proteus mirabilis ESBL (-)	2	1	0.34	0.56

N – number of bacterial strains; χ^2 – test of independence with Yates correction; p – significance level

4) Analysis of the relationship between the colonization of the nasal cavity and pharynx with Gram (+) and / or Gram (-) bacteria strains and selected demographic, anthropometric and biochemical parameters**.**

Age, BMI, HbA1c, duration of diabetes. The analysis of variance (ANOVA) showed no statistically significant correlation between the colonization of the nose and throat with strains Gram (+) or Gram (-), as well as Gram (+) and Gram (-) and the age, body mass index (BMI), HbA1c concentration or duration of diabetes.

Gender. As a result of the conducted analysis, there was no correlation between gender and the carriage of *Staphylococcus aureus MSSA* (P = 0.1745), *Staphylococcus epidermidis MRCNS* (P = 0.7141*), Staphylococcus epidermidis MSCNS* (P = 0.7069) and *Staphylococcus haemolyticus* = MSCNS 0.5999).

Overweight and obesity. Analysis of the relationship between the prevalence of overweight or obesity in diabetic patients (defined on the basis of the body mass index) and colonization with opportunistic species, showed that in 81.1% of overweight people Gram (+) microorganisms were isolated from the nose and throat. In obese patients, in 83.7% of the respondents Gram (+) microorganisms were also identified in the nose and throat. However, no statistically significant differences were found in the prevalence of overweight or obesity in relation to colonization with Gram (+) or Gram (-) strains and Gram (+) or Gram (-) (P = 0.295).

Abdominal obesity. Abdominal obesity was assessed on the basis of waist circumference criterion, which within the overweight category (BMI ≥ 25 kg/m2) is ≥80 cm in women and ≥94 cm in men. In patients with no nasal colonization with *Staphylococcus aureus MSSA*, the mean waist circumference was 100.9 cm, and 100.5 cm in patients with *Staphylococcus aureus MSSA* colonization. The differences were not statistically significant (P = 0.887). Similarly, no significant differences in waist circumference were observed in the case of colonization with *Staphylococcus epidermidis MRCNS, Staphylococcus epidermidis MSCNS* and *Staphylococcus haemolyticus* strains.

Lipid metabolism disorders. Statistical analysis of the dependence of nasal colonization by *Staphylococcus aureus MSSA* on lipid metabolism disorders (HDL cholesterol, LDL cholesterol and triglycerides), showed that in patients with an average LDL concentration of 3.63 mmol / l (+/- 1.28 mmol / l), 20.5% were carriers of *Staphylococcus aureus MSSA* strains, while in patients with an average LDL concentration of 3.05 mmol / l (+/- 1.00 mmol / l), 79.5% were carriers (P> 0.05).

Carriage of *Staphylococcus aureus* in the nasal cavity. Bacteriological examination of the nasal swabs showed that 18 patients (N=x) were carrying MSSA *Staphylococcus aureus* in the nasal cavity. There were no differences between the groups of patients, e.g. in terms of glycaemic control, depending on the above-mentioned carriers (Tab. 3).

Table 3. Characteristics of patients who were carriers and non-carriers of Staphylococcus aureus in the nasal cavity

	Carriage of Staphylococcus aureus MSSA in the nasal cavity		
	No	Yes	P*
age (years)	68.00	62.50	0.197496
BMI (kg/m^2)	0.92	0.93	0.134965
waist / hip ratio WHR	31.05	30.10	0.112269
duration of diabetes (years)	6.00	10.50	0.101491
leukocytes (10^3/µl)	7.00	7.71	0.721163
haemoglobin (g/dl)	4.40	4.62	0.305704
fasting glucose (mg/dl)	126.85	127.70	0.760226
postprandial glucose (mg/dl)	148.00	140.00	0.659971
HbA1c (%)	6.80	6.55	0.458665
serum creatinine (mg/dl)	0.90	0.90	0.500969
serum uric acid (mg/dl)	5.25	5.25	0.771677
total serum cholesterol (mg/dl)	115.00	131.00	0.456336
Alat (U/l)	50.00	44.00	0.321787

*Mann-Whitney test

Relationship of the carriage of *Staphylococcus aureus* bacteria in the nasal cavity with comorbidities in patients with type 2 diabetes. There was no relationship between the carriage *of Staphylococcus aureus* in the nasal cavity with the coexistence of allergy, chronic obstructive pulmonary disease or asthma, chronic sinusitis, chronic kidney disease, liver parenchymal damage, gastroesophageal reflux, or neoplastic disease (Tab. 4).

Table 4. History of comorbidities and their relationship to the carriage of Staphylococcus aureus in the nasal cavity of people with type 2 diabetes.

lp	Disease	No. of people in total	% of the entire study group	No. of people who were known carriers of Staphylococcus aureus in the nose
1	Hypertension	79	89.8	17
2	Chronic coronary artery disease	31	35.2	8
3	Allergy	4	4.5	0
4	Chronic obstructive pulmonary disease	2	2.3	0
5	Chronic obstructive pulmonary disease and pneumoconiosis	1	1.1	0
6	Bronchial asthma	5	5.7	1
7	Sarcoidosis	1	1.1	0
8	Chronic tonsillitis	1	1.1	1
9	Chronic sinusitis	1	1.1	0
10	Features of liver parenchymal dysfunction	15	17.0	2
11	Features of chronic kidney disease (stages 1–3)	8	9.1	1
12	Features of parenchymal liver dysfunction and chronic kidney disease (stages 1–3)	4	4.5	0
13	Gastroesophageal reflux	10	11.4	1
14	Presence of dentures	56	63.6	11
15	Cancer	4	4.5	0
16	Suspicion of sleep apnea	2	2.3	0

DISCUSSION

Own research concerned assessment of the composition of the nasopharynx microflora in people with type 2 diabetes, and did not show symptoms of active infection. In patients without infection, potentially pathogenic flora was found in the nasal cavity, mainly *Staphylococcus* in over 80% of the subjects, and in the throat in over 20%. In total, 90 potentially pathogenic strains were isolated and identified. Taking into account numerous factors influencing the composition of the microbiome, an analysis of the relationship between the bacterial carrier and selected anthropometric parameters, duration of diabetes, diabetes control indicators and comorbidities, was carried out. There was no correlation between colonization of the nose and throat with Gram (+) or Gram (-) strains and patients' age, body mass index (BMI), HbA_1c concentration and duration of diabetes.

The literature presents the results of bacteriological analyzes of various biological materials, including nasal and throat swabs from diabetic patients with concomitant infection.

In a study of 551 residents of San Luis Valley in Colorado, USA, the authors found no statistically significant increase in the relative risk of *Staphylococcus aureus* nasal colonization in 188 patients with non-insulin-dependent diabetes mellitus (NIDDM), compared with 363 non-diabetic patients. The correlation between the results of bacteriological tests and age, gender, ethnic origin, country of residence, and the frequency of hospitalizations or medical visits in the year preceding the study, was not significant. Among patients with diabetes, *Staphylococcus aureus* colonization was not associated with the type of diabetes treatment, level of glycaemic control, or duration of diabetes [19]. In the current study, the composition of bacteria in the nasopharynx was analyzed depending on the body weight of the patients. It was found that potentially pathogenic Gram(+) microorganisms were found in 81.1% of overweight and 83.7% of obese people.

Staphylococcus aureus is an organism often isolated from the nasopharynx in the general population [20]. It is estimated that at least 10% of healthy people are permanent carriers of Staphylococcus aureus, and 70–90% are transient carriers [9]. It is emphasized in the literature that *Staphylococcus aureus* plays an important role in the development of clinically overt infections, their course and prognosis, especially in immunocompromised individuals [20]. Diabetic patients are a group of people predisposed to infection with this pathogen. Colonization of the nose and nasopharynx by *Staphylococcus aureus* is more common in people with diabetes than in the general population. Wertheim et al., examining patients with *Staphylococcus aureus* bacteraemia, found that in 25% of patients with type 2 diabetes, the nasal cavity was colonized with this bacterial strain [21]. In a study conducted in Japan, in an isolate taken from the conjunctival sac, it was found that methicillin-resistant coagulase-negative *Staphylococcus* strains were significantly more common (20.3%) in diabetic patients than in non-diabetic patients (7.0%) [22]. The current study showed no relationship between the carriage of *Staphylococcus aureus* bacteria in the nasal cavity of people with type 2 diabetes, and the coexistence of diseases predisposing to local and/or general immunity, such as: allergy, chronic obstructive pulmonary disease, asthma, chronic sinusitis, chronic kidney disease, damage to the liver parenchyma, and gastroesophageal cancer.

Limitations and strengths of the study. Because the study was financed from the own resources of the doctor's office, it was not possible to include either a control group or conduct a multi-centre study. As the study was conducted in a single GP practice, the results obtained cannot therefore be generalized to the general population of diabetic patients.

The strong point of the study is undertaking this type of research in the conditions of a family doctor's practice – no similar scientific studies have been found in the literature. Extending the scope of monitoring the patient's health with microbiological parameters may contribute to improving

the quality of care and the sense of security of patients with type 2 diabetes in primary care facilities.

The reform of the health care system in Poland in 1995 meant that the care of patients with type 2 diabetes was taken over by family doctors. When caring for patients with type 2 diabetes, they should be aware that monitoring the course of the disease, in addition to basic biochemical parameters, i.e. glucose, HbA1c, creatinine, lipid profile, assessment of bacterial microflora should also be included. Numerous publications point to the risks associated with uncontrolled states of hyperglycaemia, which may favour the colonization of *Staphylococcus aureus* and the development of related local and systemic infections. Frequent hyperglycaemic states cause immune disorders, i.e. impaired functioning of neutrophils, disorders of chemotaxis, adhesion and the complement system. Patients with diabetes are three times more likely to be infected with *Staphylococcus aureus,* compared to the general population. At the same time, it should be mentioned that the duration of diabetes and diabetic complications may additionally increase the risk of systemic infection [23].

Better glycaemic control and intensive education about the lifestyle of diabetes patients, including personal hygiene, may contribute to reducing the risk of local and systemic bacterial infections. In the era of increasing antibiotic resistance of bacterial pathogens, the selection of appropriate and effective therapy becomes increasingly more difficult. In order to assist physicians in the selection of the most appropriate treatment for inflammation in type 2 diabetes, future studies should evaluate the drug susceptibility and drug resistance of pathogenic strains identified in this group of patients.

CONCLUSIONS

1. People suffering from type 2 diabetes who do not show symptoms of infection are often carriers of potentially pathogenic bacteria in the nasopharynx
2. The species and quantitative composition of the throat and nose microbiome in people with type 2 diabetes differ.
3. The carriage of the *Staphylococcus aureus MSSA* strain in the nose does not correlate with long-term control of diabetes measured by the concentration of glycosylated haemoglobin, nor does it show any association with the presence of comorbidities predisposing to weakened general immunity

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A questionnaire was included which was used during the interview with the patients

ATTACHMENT 1

SURVEY FOR PEOPLE WITH DIABETES

Last name …… Name ……
Year of birth …… Sex M F
Type of diabetes ……
Body weight (kg) …… Height (cm) ……
Waist circumference (cm) … Hips circumference (cm)…
BMI ……
Blood RR (mmHg) ……

Diagnosis of diabetes in the calendar year ……
Comorbidities:
……
Previous operations, accidents (year and type of operation / injury):
……
Disability: YES NO
Is disability a complication of diabetes? YES NO

Stimulants and addictions:
Tobacco smoking **YES NO**
How many pieces a day he smokes ……

Diabetes education:
Do you follow a diabetic diet **YES NO Sometimes**
How much time do you spend on physical activity per week?
> 30 minutes 30–60 minutes 60–120 minutes
120–180 minutes <180 minutes I do not exercise
(physical exertion also includes daily climbing stairs, brisk walking, etc.)
How many hours a day do you watch TV? ……

SELF-CONTROL:
Do you have a blood glucose meter? **YES NO**
Do you keep a self-control notebook?**YES NO Sometimes**

TREATMENT OF DIABETES (please specify the year of treatment initiation):
Only by diet and exercise ……
Diet + Oral anti-diabetic medications ……
- biguanides (Metformin) ……
- sulfonylurea derivatives ……
- α-glucosidase inhibitors ……
- incretin drugs ……

If you are taking two or three anti-diabetic medications, please list them:
Diet + oral medications + basal insulin ……
Insulin therapy (two or more injections) ……
Number of units per day ……
Number of injections per day ……
Insulin pum ……

Treatment other than hypoglycemic therapy: YES NO
Hypertension …… Ischemic heart disease ……
Heart failure …… Dyslipidemia ……
Diseases of peripheral vessels ……
Diabetic retinopathy ……
Chronic renal failure ……
Diabetic foot ……
Liver disease ……
Depressions ……
Chronic infections (what) ……
Thyroid diseases (what kind) ……
Other (what) ……

Occurring hypoglycaemic episodes YES NO:
Healed on his own, without the help of others ……. how long a week?
Requiring administration of glucagon and / or intravenous glucose …… how many a year?
Requiring hospitalization …… how many a year?

Hyperglycemic Emergency YES NO
Ketoacidosis …… how many in a year?
Diabetic coma …… how many in a year?

VISION ORGAN – examination in the last 12 months:
YES NO

KIDNEY AND URINARY SYSTEM – examination in the last 12 months: **YES NO**
Is there microalbuminuria? YES NO
Is there constant proteinuria> 0.5 g / 24h? YES NO

HEART (data from the last 12 months)
Has an ECG test been performed? YES NO
Was a heart echo performed YES NO
Are there signs of ischemia on the EKG? YES NO
Previous myocardial infarction? YES NO
Has a cardiovascular fitness test been performer YES NO
Has a coronography been performed? YES NO

CENTRAL NERVOUS SYSTEM
History of stroke? YES NO
Was ultrasound of the carotid arteries performed?
YES NO

FEET
Examination in the last 12 months YES NO
RIGHT FOOT LEFT FOOT
YES NO YES NO

OWNERSHIP OF DENTAL PROSTHESES: YES NO

TAKING ANTIBIOTICS IN THE LAST 6 WEEKS: YES NO

If YES, provide the name of the antibiotic you are taking:
……
HOW OFTEN WAS ANTIBIOTHERAPY USED IN THE LAST 12 MONTHS?
…… how many in a year?
WHY WAS ANTIBIOTHERAPY USED?

HISTORY OF COMMUNICABLE DISEASES? ……

Date ……