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Comparison of chosen clinical markers in patients with type 2 diabetes mellitus and latent carbohydrate metabolism disorders

During the last 25 years growing epidemic of type 2 diabetes mellitus is observed. Full symptomatic clinical phase is followed by latent carbohydrate disturbances usually lasting for many years before and systematically intensifying during the time. Early diagnosis and treatment could lower the frequency of vascular complications, determined in most diabetic patients at the moment of diagnosis (1–3). Diabetes mellitus is a chronic disease of metabolic dysregulation. The main characteristic feature of this disease is hyperglycemia which causes different pathologies in most of body organs. Common manifestations of long-term hyperglycemia are: neuropathy – nervous system damage and vascular diseases (2, 3). The aim of this study was to determine differences of chosen clinical markers in groups of patients with latent carbohydrate disorders, previously diagnosed diabetes mellitus and long-term type 2 diabetes.

MATERIAL AND METHODS

The study population consisted of 54 patients from endocrinology outpatients' clinic assessed during students' research practice in Zwierzyniec in July 2006. Among this group 43 were females (F) and 11 males (M). The mean age of individuals was 63.2±10.0 years (range 46 to 82). All the patients suffered from type 2 diabetes mellitus (previously or recently diagnosed) or latent carbohydrate disorders. Every patient had examined glycaemia in fasting state (FBG), measured in serum vein blood with a biochemical analyser. In cases with value >100 mg% oral glucose tolerance test with 75 g glucose was performed. Evaluated clinical markers were: age, body mass index (BMI) and waist circumference (WC). BMI was determined with weight and height evaluation. Waist circumference was measured in centimetres. Qualification of carbohydrate disturbances was carried out according to The Polish Association of Diabetology standards from 2006. Statistical analysis was carried out using Student t test.

RESULTS

The patients were divided into three groups depending on the determined type of disorder. Group 1 covered 13 subjects (G 1) – 10 F,3 M with sooner diagnosed type 2 diabetes; group 2 (G 2) – 11 patients (F – 9; M – 2) with recently diagnosed type 2 diabetes; group 3 (G 3) – 30 patients (F – 24; M – 6) with disability glucose tolerance (impaired fasting blood glucose = IFG or impaired tolerance glucose = ITG). Results related to each parameter in every group were collected

and analyzed separately (Table 1). The highest medium age value was characteristic of the group of patients with long-term diabetes. In subjects with recently diagnosed diabetes and with glucose intolerance the mean age did not vary significantly. In all the three groups (G 1, G 2 and G 3) females were in majority: 77%, 82%, 80% respectively. BMI was the highest in patients with long standing diabetes, decreased in recently diagnosed type 2 diabetes, with the lowest value in subjects with latent glucose intolerance. The BMI value was statistically significantly higher between G 1 and G 3 groups (Table 1). The highest average value of waist circumference characterized the subjects with previously diagnosed diabetes, in patients with newly diagnosed diabetes or glucose intolerance these values were distinctly lower and did not differ indeed. The highest glycaemia in fasting state characterized the patients with long lasting diabetes, and decreased gradually in groups with recently diagnosed diabetes and glucose intolerance which was statistically significant among all the studied groups (Table 1). The highest averages of all evaluated parameters characterized patients with long lasting type 2 diabetes (group 1).

Table 1. The measured parameters of patients from all groups (medium and ±SD)

Parameter	G1 Sooner diagnosed diabetes	G2 Recent diagnosed diabetes	G3 Latent carbohydrate disorders	Results of statistic analysis
Number of patients	13	11	30	
Age (years)	66.4±10.2	62.2±10.5	62.1±9.8	G1 vs G2 $p<0.05$ G2 vs G3 = NS G1 vs G3 $p<0.001$
Sex	10 F; 3 M	F 9; M 2	F 24; M 6	–
BMI (kg/m^2)	31.7 ±5.4	30.4 ±3.0	28.6 ±4.4	G1 vs G2 =NS G2 vs G3 $p<0.01$ G1 vs G3 $p<0.001$
FBG (mg%)	136.4 ±27.4	122.0 ±13.0	113.7 ±9.2	G1 vsG2 $p<0.01$ G2 vs G3 $p<0.001$ G1 vs G3 $p<0.001$
WC (cm) Whole group: *Female < 80 cm *Male < 94 cm	 106.0 ±15.1 102.8±6.4 111.3±25.5	 103.8 ± 7.7 100.9 ± 7.2 110.5 ± 3.5	 97.3 ±11.4 94.9±10.8 106.2±9.7	Whole group G1 vs G2 = NS G2 vs G3 $p<0.001$ G1 vs G3 $p<0.001$ Female G1 vs G2 = NS G2 vs G3 $p< 0.001$ G1 vs G3 $p<0.001$ Men G1 vs G2 = NS G2 vs G3 = NS G1 vs G3 = NS

*Criteria of International Diabetes Federation (IDF) 2005

DISCUSSION

It is known that an together with an increase in abdominal obesity, three is a parallel increase in prevalence of latent impaired glucose tolerance disorders and type 2 diabetes mellitus (2, 3, 5, 6).

A number of anthropometric indices is used for evaluation of abdominal fat tissue accumulation. The increase in each of them was correlated with the increase in glycaemia, especially after an oral glucose load. There were conducted a lot of studies to determine, which of these indices is the most suitable for the assessment of glucose tolerance disturbances risk in clinical practice.

The results revealed that all of them have a similar value for type 2 diabetes risk assessment and showed significantly weaker relation with IGT (5, 6, 7). Frequency of pre-diabetic conditions and diabetes type 2 increases with age and is higher in females (8, 9). In our study the patients with diagnosed diabetes had also the highest age average. Females predominate in all the three groups. The object of our study was the selected population of patients with metabolic syndrome and carbohydrate disorders. The authors aimed to determine changes of visceral obesity index in patients with latent glucose tolerance disorders during progression to full symptomatic diabetes. Gradually growing values of the anthropometric central adiposity markers were in the groups with latent deterioration in carbohydrate metabolism essential factor deteriorating control of glycaemia. There is no influence of age but battle with abdominal obesity and visceral fatty tissue among patients with earlier diagnosed carbohydrate disorders should be an integral part of therapy. Measurement of waist circumference within body mass index categories as a screening tool for increased health risk and prophylactic activity is especially noteworthy for doctor's practice because of its high diagnostic precision and exceptional simplicity of its determination. Deterioration of carbohydrate metabolism control is connected with increased metabolic syndrome features. They are the most intensified among patients (women) with long-term, apparent diabetes.

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SUMMARY

Carbohydrate disorders are one of the serious and still rising problems in highly developed countries. The paper aimed to determine differences in fasting blood glucose (FBG) age, body mass index (BMI) and waist circumference (WC) in groups of patients with latent carbohydrate disorders or recently diagnosed and long-term type 2 diabetes. The studied group consisted of 54 (43 F and 11 M) patients with carbohydrate disorders. Patients were divided into three groups depending on the determined type of carbohydrate disorder. Group 1 covered 13 subjects (G 1) – 10 F, 3M with sooner diagnosed diabetes; group 2 (G 2) – 11 patients (F – 9; M – 2) with recently diagnosed diabetes; group 3 (G 3) – 30 patients (F – 24; M – 6) with disability glucose tolerance (IFG and ITG). Data were collected and analyzed during students' research practice. Each parameter in every group was collected and analysed separately. Average values of the studied parameters were, respectively, in groups G 1, G 2, G 3: age 66.4±10.2 years, 62.2±10.5 years, 62.1±9.8 years; FBG 136.4±27.4 mg%, 122.0± 13.0 mg%, 113.7±9.2 mg%; BMI 31.7±5.4 kg/m^2, 30.4±3.0 kg/m2, 28.6±4.4 kg/m^2; WC 106.8± 15.1 cm; 103.8 ±7.7; 97.3±11.4 cm. The highest averages of the evaluated parameters characterized the group with sooner diagnosed type 2 diabetes. Conclusion: Deterioration of carbohydrate metabolism is connected with increased metabolic syndrome features (BMI, WC). They are the most intensified among patients (women) with long-term, apparent diabetes.

Porównanie wybranych cech klinicznych u chorych z cukrzycą typu 2
oraz u chorych z utajonymi zaburzeniami metabolizmu węglowodanów

Zaburzenia gospodarki węglowodanowej są poważnym i wciąż rosnącym problemem zdrowotnym krajów wysoko rozwiniętych. Celem pracy jest ustalenie różnic dotyczących glikemii na czczo (FBG), wieku, wskaźnika masy ciała (BMI) i obwodu pasa (WC) między grupami pacjentów z utajonymi zaburzeniami węglowodanowymi (IFG i ITG), świeżo zdiagnozowaną oraz trwającą od kilku lat cukrzycą typu 2. Badana grupa chorych obejmowała 54 (43 K; 11 M) chorych z zaburzeniami gospodarki węglowodanowej. W zależności od typu zaburzeń chorych podzielono na trzy grupy. Grupa 1 liczyła 13 osób (G 1) – 10 K, 3M z wcześniej rozpoznaną cukrzycą typu 2; grupa 2 (G 2) – 11 pacjentów (9K; 2 M) ze świeżo rozpoznaną cukrzycą typu 2; grupa 3 (G 3) – 30 osób (24 K; 6 M) z nieprawidłową tolerancją glukozy (IFG i ITG). Dane zebrano podczas studenckiego obozu naukowego. Wartości średnie ocenianych parametrów wynosiły w badanych grupach odpowiednio dla G 1, G 2, G 3: wiek 66,4±10,2 lat, 62,2±10,5 lat, 62,1±9,8 lat; FBG 136,4±27,4 mg%, 122,0± 13,0 mg%, 113,7±9,2 mg%; BMI 31,7±5,4 kg/m^2; 30,4±3,0 kg/m^2; 28,6±4,4 kg/m^2; WC dla całej badanej grupy:106,8±15,1 cm, 103,8±7,7, 97,3±11,4 cm. Najwyższe wartości analizowanych parametrów charakteryzowały pacjentów z wcześniej wykrytą cukrzycą typu 2. Pogarszanie się metabolizmu węglowodanów jest związane ze wzrostem cech charakterystycznych dla zespołu metabolicznego, głównie BMI i WC. Są one najbardziej nasilone wśród kobiet z wieloletnią cukrzycą.