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Diabetes mellitus type 2 is unknown in 75% of cases – results of population study in rural areas of Lublin Region (Eastern Poland)

On the basis of epidemiological studies on type 2 diabetes mellitus (DM 2) prevalence carried out at the end of the 20th century in various regions of the world and their comparison with the data collected in the same regions in the previous years showed a significant increase in the number of newly diagnosed diabetes. People started to talk about an epidemic or even a pandemic of diabetes. It should be kept in mind, however, that the criteria for DM 2 recognition have been changed very many times over the last couple of decades. Methods of glucose level measurement have also been changed and improved. Therefore it is practically impossible to define precisely the speed of the growth of this epidemic. Epidemiological data relating to Poland are especially scant and the only survey (apart from our survey from the late 1980s) in DM 2 prevalence in the countryside inhabitants we have managed to reach was conducted by Czyżyk and Kasperska in 1960–1961 (3). That is why, when embarking on a project commissioned by the Ministry of Health Care and Social Welfare regarding the prevalence of DM 2 in the Lublin Region, we found it extremely interesting to examine not only the inhabitants of the Lublin Town, but also a representative sample of the Lublin countryside dwellers.

SUBJECTS AND METHODS

The study involved the inhabitants aged over 35 living in the area of selected communes of the former Lubelskie Voivodship (province) in the administrative boundaries from 1999. The survey carried out from November 1998 to January 2001 was a part of a multi-centre epidemiological study carried out within the framework of Commissioned Project of the Ministry of Health Care and Social Welfare *Type 2 Diabetes Mellitus Epidemiology in Demographically Well-Defined Part of Population Numbering 100,000 – 200,000 People on the Assumption of a 3–5% Random Sample in the Population Aged Over 35*, coordinated by Prof. Zbigniew Szybiński from Endocrinology Clinic of Jagiellonian University in Krakow (5).

The examined population was selected from inhabitants lists of the province by a double draw. In the first stage, out of 1,000,000 of the inhabitants of the province, urban and rural communes, 100,000 were drawn. In the second stage, 3,000 people from towns and the countryside were drawn out of this number – proportionally in age groups. In this paper we present the results relating to the rural population.

The study was conducted in rural healthcare centres by a team consisting of doctors and nurses of Primary Healthcare Department of Lublin Medical University. The selected persons were invited for an examination by mail and, in the event of the lack of an answer, they were invited again by social and family nurses. The study was suspended when the attendance rate reached the level of 60%. A detailed medical history of the examined was taken encompassing the data on diabetes, obesity, arterial hypertension, lipid disorders and ischaemic heart disease. The history also covered the data relating to the prevalence of the smoking habit and drinking of alcohol, daily physical activity, menopause age and substitutive hormonal replacement therapy as well as the remaining drugs used. Physical examination of the subjects was made. Their body mass, height, waist and hip circumferences and arterial blood pressure were measured. Fasting vein blood samples were taken to determine the glucose concentration level in full blood. Subjects without prior diabetes diagnosis, whose fasting glicaemia was below 8 mmol/l (144 mg/dl), were given a 75 g glucose dissolved in 300 ml of water. Blood samples were taken again after 2 hours to determine the glucose concentration level. Glucose concentration level was measured with test strips by means of the Glucotrend glucometer (by Roche).

Glycaemia was assessed according to the 1985 WHO criteria (10). DM 2 was diagnosed, when the fasting full vein blood glucose concentration level was $\geq$ 6.7 mmol/l (120 mg/dl) and/or $\geq$ 10 mmol/l (180 mg/dl) in the 2nd hour after the oral load. Impaired glucose tolerance (IGT) was diagnosed when fasting values were < 6.7 mmol/l (120 mg/dl) and $\geq$ 6.7 mmol/l (120 mg/dl) and < 10 mmol/l (180 mg/dl) in the 120th minute of the test. Weight categories were based on the body mass index (BMI) according to the WHO classification, accepting the values < 25.0 for the normal weight, 25.0–29.9 for overweight and $\geq$ 30.0 kg/m^2 for obesity (9).

All the data was gathered for 1795 examined persons from the countryside and 1966 from the town. Statistical analysis was made by means of the chi square test.

RESULTS

Diabetes was recognized in 17.2% of the examined subjects including 14.3% of men and 19.5% of women. Newly diagnosed DM 2 constituted 74.8% of cases (71.9% for women and 79.6% for men). The prevalence of DM 2 was significantly higher in the rural population than in the urban population in Lublin Region (17.2% vs 14.1%; p < 0.02). The difference in DM 2 prevalence was the highest among the studied women (19.5% vs 12.3; p < 0.001). IGT was diagnosed in 34.7% of women and 25.2% of men (in 30.5% of all subjects). DM 2 was found more frequently in women than in men in the rural population (19.5% vs 14.5%). This difference was statistically significant (p < 0.01) in whole population, but was not significant in women and men aged 35–64.

Table 1. Prevalence of glucose tolerance disorders in rural population
of Lublin Region – age groups breakdown

Sex	Age (years)	Without IGT and DM 2		IGT		Diabetes				All subjects	
						known		newly detected			
		N	%	N	%	N	%	N	%	N	%
Female + Male	35-44	252	14.0	65	3.6	3	0.2	18	1.0	338	18.8
	45-54	258	14.4	136	7.6	17	0.9	45	2.5	456	25.4
	55-64	216	12.0	121	6.7	13	0.7	46	2.6	396	22.1
	≥65	212	11.8	226	12.6	45	2.5	122	6.8	605	33.7
	all	938	52.3	548	30.5	78	4.3	231	12.9	1795	100

We observed a statistically significant increase in DM 2 prevalence according to higher age and BMI groups (p < 0.001). Prevalence of impaired glucose tolerance as well as known and newly diagnosed diabetes in respective age groups is presented in Table 1. Prevalence of impaired glucose tolerance (IGT and diabetes) in respective age groups is presented in Table 2.

Table 2. Prevalence of glucose tolerance disorders in rural population of Lublin Region – BMI categories breakdown

Sex	BMI	Without IGT and DM 2		IGT		Diabetes				All subjects	
						known		newly detected			
		N	%	N	%	N	%	N	%	N	%
Female	<25	163	16.2	83	8.3	8	0,8	23	2.2	277	27.5
	≥25 i <30	167	16.6	114	11.3	11	1.1	44	4.4	336	33.4
	>30	131	13.0	152	15.1	36	3.6	74	7.4	393	39.1
	all	461	45.8	349	34.7	55	5.5	141	14.0	1006	100
Male	<25	215	27.2	82	10.4	5	0.6	31	3.9	333	42.2
	≥25 i <30	187	23.7	75	9.5	3	0.4	29	3.7	294	37.3
	>30	75	9.5	42	5.3	15	1.9	30	3.8	162	20.5
	all	477	60.5	199	25.2	23	2.9	90	11.4	789	100
Female + Male	<25	378	21.1	165	9.2	13	0.7	54	3.0	610	34.0
	≥25 i <30	354	19.7	189	10.5	14	0.8	73	4.1	630	35.1
	>30	206	11.5	194	10.8	51	2.8	104	5.8	555	30.9
	all	938	52.3	548	30.5	78	4.3	231	12.9	1795	100

DISCUSSION

The figures relating to diabetes prevalence in the countryside are unexpectedly high. We found that every 5th female and every 7th inhabitant male from the Polish countryside have diabetes and that an overwhelming majority of them do not even know about this. What has this situation resulted from? On the one hand, it is the consequence of the unawareness of the healthcare system resulting from the lack of representative studies in rural areas, which would suggest the necessity of more energetic search for this disease. The Polish literature offers only results of the research in the rural population obtained by Czyżyk et al. (3) in the 1960's, which – in accordance with the then existing research methods and diagnostic criteria – estimated the prevalence to be below 1%. Research carried out in the mid-1980's by a team from our Department on a cohort of 11,000 countryside dwellers from the area of 16 Lublin Region communes estimated diabetes prevalence at 2.6% (6). It should be noted that despite the fact that the research was carried out on a satisfactory number of the population, it related to a randomly selected sample of the population of the region. Nowadays, results are based on a research carried out on a sample selected according to the epidemiological requirements and meet the requirements of necessary attendance rate. They are even more interesting as this is a social group, which – due to the fact, that they are self-occupied on their farms – is not subjected to obligatory periodical medical examinations. This not only results in our wrong idea about the morbidity rate of this part of population but also in their lack of a periodical health examination habit. This is also probably a consequence of low health awareness of the villagers. Age structure has its impact on the health status in the countryside as well. Domination of the elderly people in rural areas must have also influenced the diabetes prevalence rates. Our results

clearly prove greater prevalence of diabetes in older age groups. The epidemic of obesity observed in rural population (40% of women has BMI ≥ 30 kg/m^2) is also a risk factor which significantly influences the diabetes morbidity rate. Many authors submit different rural areas diabetes prevalence rates in the world. The prevalence of around 1% was found among others in the research carried out on the Fiji in the 1980's (11) and in the research conducted in the late 1990's on the rural population of Cameroon (7). A research carried out on the rural population of Bangladesh estimates diabetes occurrence at 3.8% (1), whereas King (4) and Sekikawa (8) estimated it at around 7% and 10% in the rural populations of Uzbekistan and Japan, respectively. At the same time it has been proved that diabetes prevalence in the rural population is lower than in the urban populations of the compared regions (1,2,4,8,11,12). Mbanya obtained results relating to newly diagnosed type 2 diabetes which were similar to ours – the rate of newly diagnosed type 2 diabetes in the rural population of Cameroon was higher than in towns and amounted to 67% (7).

The research we carried out simultaneously on a comparable sample of the Lublin town inhabitants shows a slightly lower diabetes prevalence rate in the town (14.1% of subjects) but the newly diagnosed diabetes rate is much higher and amounts to 56%. The difference in the prevalence rates was probably influenced by a slightly different age structure in the town, where young people prevailed. Similar results relating to the prevalence rate of newly diagnosed diabetes in the urban population were also obtained by other authors (7).

The precision of glycaemia determination and its impact on the reliability of the data obtained by means of the test strips and glucometer may raise some doubts. At this point we would like to draw attention to the realities of this type of research. The drawn group consisted of subjects gathered in smaller groups of 2–5 persons and scattered over health centres located sometimes as far away as 50 km from the research centre. Transportation of biological material over this distance would result in a greater risk of obtaining erroneous results. A comparison of the precision of the strip tests (whole vein blood) and the enzymatic method (blood serum) we made in our laboratory on the same biochemical material did not show any statistically significant differences in the distribution results (in print, Annales UMCS).

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SUMMARY

There are scare data concerning the prevalence of diabetes mellitus in rural population in Poland. Our study, performed in 1806 subjects from rural areas, showed that prevalence of diabetes mellitus in rural population is unexpectedly high (17.2%) and is higher than in urban population. The fact that ¾ of the cases turned out to be the cases of previously undiagnosed diabetes mellitus is especially distressing. Thus, main efforts should be concentrated on the necessity of screening tests in the group which is not subjected to periodical medical examinations, the more so that the prevalence of obesity in women reached 40%. The family physician and an appropriate organisation of educational prophylaxis can play a major role in fighting this problem.

Cukrzyca typu 2 wśród mieszkańców wsi lubelskiej nierozpoznana w 75% przypadków

Dane dotyczące rozpowszechnienie cukrzycy w środowisku wiejskim w Polsce są bardzo skąpe. Badania przeprowadzone przez nas na grupie 1806 osób z tego środowiska wykazały, że rozpowszechnienie cukrzycy w populacji wiejskiej jest nadspodziewanie wysokie (17,2%) i przewyższa rozpowszechnienie cukrzycy w populacji miejskiej. Szczególnie niepokojący jest fakt, że aż w ¾ przypadkach jest to cukrzyca dotychczas nierozpoznana. Dlatego główny nacisk należy położyć na konieczność przesiewowych badań w kierunku cukrzycy tej warstwy ludności Polski, która z racji wykonywania pracy we własnym gospodarstwie nie podlega obowiązkowi okresowych badań profilaktycznych, zwłaszcza że rozpowszechnienie otyłości, która jest głównym czynnikiem zagrożenia cukrzycą, sięga w grupie kobiet 40%. Ogromną rolę może w tym zakresie odegrać lekarz rodzinny i właściwa organizacja edukacji profilaktycznej w tym środowisku.