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THE NEW MODEL OF THE GLUCOSE DISTURBANCES IN PATIENTS ON HAEMODIALYSIS BASED ON THE CONTINUOUS GLUCOSE MONITORING SYSTEM

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BACKGROUND OF THE STUDY

Fluctuations of glucose concentration (GC) of in blood serum are an important and potentially dangerous clinical problem in HD patients with and without diabetes. This phenomenon occurs both during and after hemodialysis (HD) time.

PURPOSE OF THE STUDY

The main aim of this study was an assessment of the continuous glucose monitoring system (CGM) in the group of haemodialysis (HD) pts. The additional purpose of the study was a thorough analysis of how HD influences on glycaemia control during HD and intradialytic period.

METHOD

41 (38% from 108 preliminary recruited) HD patients (14 female, 27 male) were qualified for the project and divided into 2 groups: 20 (7 female, 13 male) with diabetes (DM group) and 21 (7 female, 14 male) without diabetes (NDM group). Each patient underwent two-days-long CGM monitoring carried out during hospitalization. Monitoring period included two HD, one after another, and 42-hours long intradialytic period. Every single HD was divided into halves and the time of intradialytic period into 7 equal six hours long parts. Guardian Real Time Medtronic® system with subcutaneous electrodes was used for CGM.

	DM	NDM	p-value DM vs NDM
No. of the pts n=41	20	21	
female n=14	7	7	p = 0,361**
male n=27	13	14	
mean age (years)	68,5 ± 9,5	59,3 ± 14,8	p = 0,024*
mean body mass (kg)	73,36 ± 15,22	68,34 ± 12,17	p = 0,249*
BMI (kg/m2)	26,22 ± 6,07	23,65 ± 4,31	p = 0,126*
mean time period from beginning of HD program (days)	869,5 (405,75÷1883,75)	420 (172÷546)	p = 0,034*

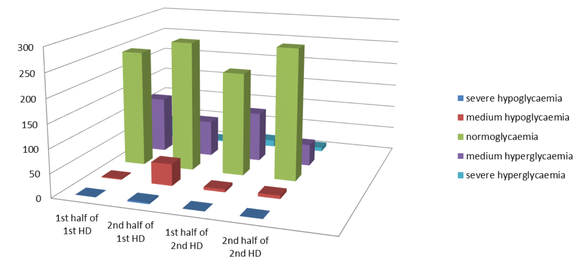
* t-Student test
** chi^2 test

The ethiology of end-stage renal failure (ESRF) in the NDM group	No. of the pts (percentage)
hypertension nephropathy	5 (23,8%)
glomerulonephritis	3 (14,3%)
polycystic kidney disease	2 (9,5%),
haematology diseases	2(9,5%)
lupus nephropathy	1(4,8%)
vasculitis	1(4,8%)
non-recognized nephropathy	5(23,8%)

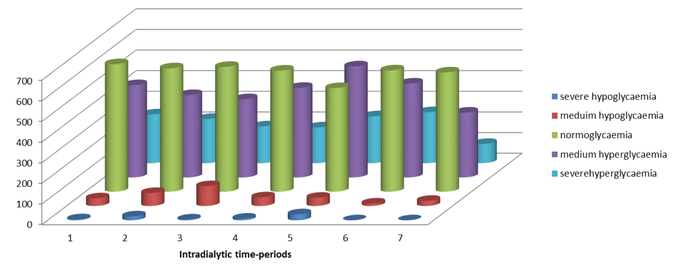
RESULTS

During all CGM period 20417 episodes of glycaemia were registered: 10285 (DM) and 10132 (NDM). During the HD 2848 episodes were registered: 1495 (DM), 1353 (NDM). During the intradialytic periods 17569 episodes were registered: 8790 (DM), 8779 (NDM). The mean glycaemia in the course of the monitoring phase was higher in the DM group than in the NDM group: 139,9(±31) mg/dl vs 113,1(±14) mg/dl (p<0,001).

No. of glycaemia measurements during HD (DM)

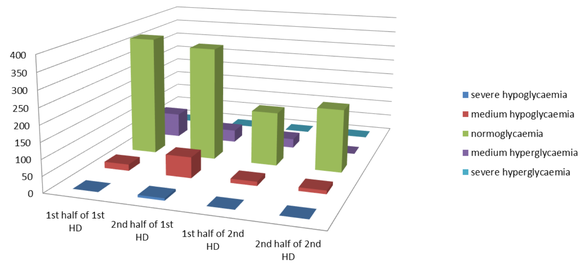


No. of glycaemia measurements during intradialytic period (DM)

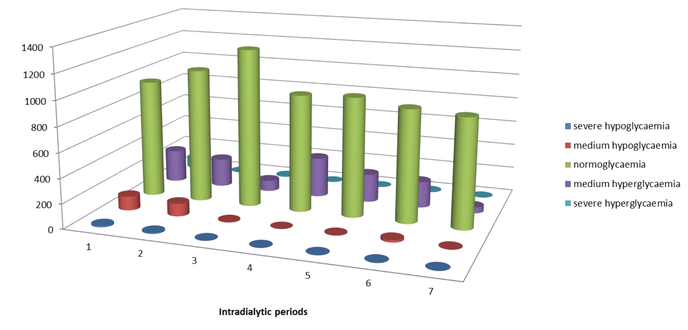


	Glycaemia value (mg/dl)
severe hypoglycaemia	<50
medium hypoglycaemia	50 ÷ 69
normoglycaemia	70 ÷ 139
medium hyperglycaemia	140 ÷ 199
severe hyperglycaemia	>200

No. of glycaemia measurements during HD (NDM)



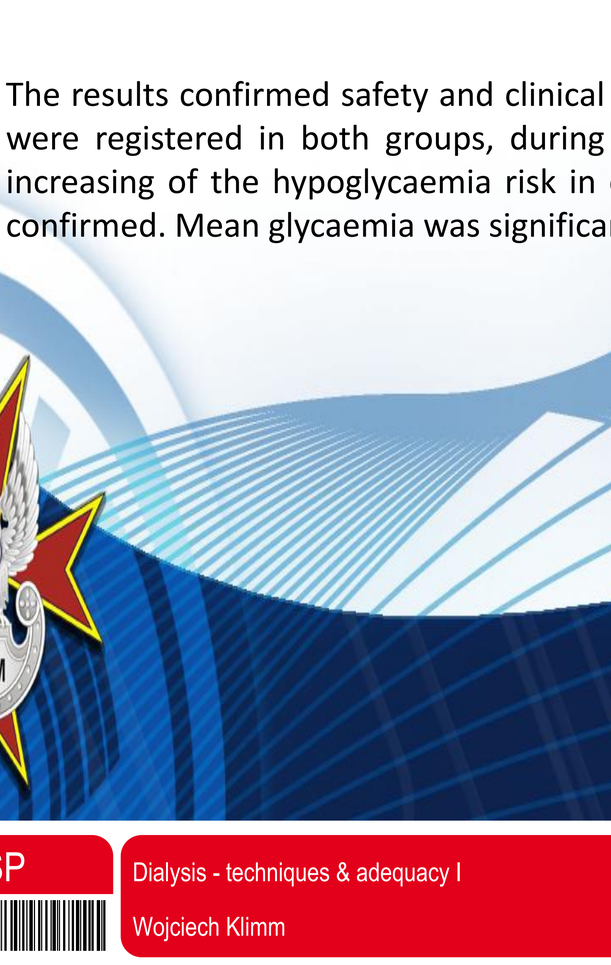
No. of glycaemia measurements during intradialytic periods (NDM)



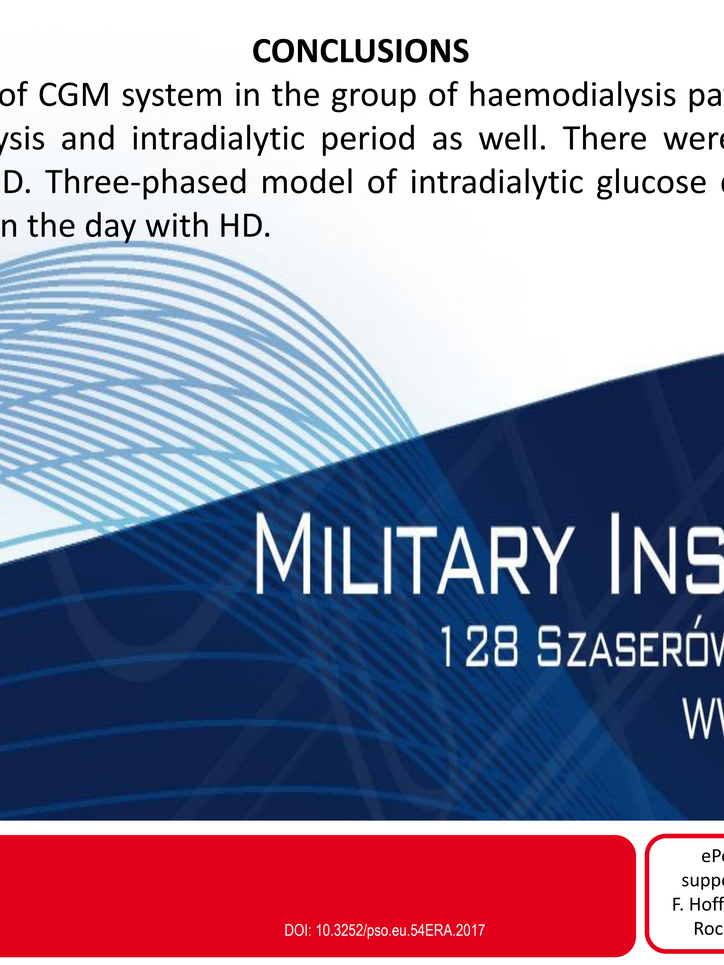
	Mean absolute difference (MAD) between CGM glucose levels and capillary glucose concentration values (%)	Correlation between CGM glucose levels and HbA_{1c} values *	Serious side-effects
DM	20,02 ± 6,8	0,7	none
NDM	17,67 ± 6,08	0,5	none

* linear Pearson's ratio (r)

Mean GC during HD



Mean GC during intradialytic time-periods



CONCLUSIONS

The results confirmed safety and clinical usefulness of CGM system in the group of haemodialysis patients. The periods of glucose high-risk disturbances were registered in both groups, during haemodialysis and intradialytic period as well. There were significant decrease of the mean glycaemia with increasing of the hypoglycaemia risk in course of HD. Three-phased model of intradialytic glucose disorders with high-risk hypoglycaemia periods was confirmed. Mean glycaemia was significantly lower on the day with HD.

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