



included 11 women (average age 48 years) and 30 men (average age 51 years). Beside the general physical examination and manifold blood pressure taking, the biochemical tests were performed to state the health condition of the examined population.

As stated by WHO, the term "arterial blood hypertension" is defined by the values of 160 mm Hg and above for the contraction pressure and 95 mm Hg and above for decontraction pressure. 16 persons were reported in the group of labile hypertension (Ist period according to WHO). 11 persons belonged to a group of fixed hypertension (IIInd period according to WHO). Finally, 14 persons created a group of hypertension connected with kidneys and heart failure (IIIrd period according to WHO). The level of cadmium and lead in blood and urine was evaluated on the basis of atomic absorption spectrophotometry (8, 15). The results were elaborated on by using statistic method and counting medium values ( $\bar{x}$ ), standard deviation ( $SD$ ), and statistic significance as compared with the control group. That was done with the sid of Cox and Cochran test (11).

## RESULTS AND DISCUSSION

Arterial blood hypertension medium values for the created groups were established as follows:

group I — Ist period — contraction pressure 171.1 mm Hg, decontraction — 106.2 mm Hg;

group II — IIInd period — contraction pressure 187.7 mm Hg, decontraction — 112.2 mm Hg;

group III — IIIrd period — contraction pressure 192.0 mm Hg, decontraction — 117.5 mm Hg.

Table 1 visualizes medium lead and cadmium values in blood and urine of the examined population. Collected medium values of these metals in blood of the hypertension group were nonsignificantly higher in comparison with the ones in the control group, including the fact that a sex factor at female patients did not discover any significant differences in comparison with medium values of the

Table 1. Mean contents of lead and cadium in blood and urine of tested population

Groups	Numerous group ( <i>n</i> )	Lead (Pb)		Cadmium (Cd)	
		The value in blood ( $\mu\text{g}/100 \text{ ml}$ ) $\bar{x} \pm SD$	The value in urine ( $\mu\text{g}/1$ ) $\bar{x} \pm SD$	The value in blood ( $\mu\text{g}/100 \text{ ml}$ ) $\bar{x} \pm SD$	The value in urine ( $\mu\text{g}/1$ ) $\bar{x} \pm SD$
Control group	15	12.80 $\pm$ 9.09	22.67 $\pm$ 12.23	1.04 $\pm$ 0.51	1.99 $\pm$ 1.79
Tested group	41	16.24 $\pm$ 7.19 <i>c</i> = 1.162	22.29 $\pm$ 11.57 <i>c</i> = 0.107	1.14 $\pm$ 0.36 <i>c</i> = 0.722	3.0 $\pm$ 2.11 <i>c</i> = 0.181
Women	11	12.19 $\pm$ 8.07 <i>c</i> = 0.180	25.09 $\pm$ 15.88 <i>c</i> = 0.422	1.02 $\pm$ 0.43 <i>c</i> = 0.108	2.09 $\pm$ 1.51 <i>c</i> = 0.475
Men	30	17.72 $\pm$ 9.40 <i>c</i> = 1.171	21.27 $\pm$ 3.50 <i>c</i> = 0.388	1.19 $\pm$ 0.33 <i>c</i> = 1.037	3.34 $\pm$ 2.22* <i>c</i> = 2.359

\**p*  $\leq$  0.05.

control group. Analyzing these metals' level in the urine similar levels of lead in urine in case of the examined group and the control group were observed. The cadmium level in the urine of blood hypertension patients was non-significantly higher as compared with the control group patients.

Considering the sex division factor, the lead level in female patients appeared to be non-significantly higher and in male patients it showed to be lower in comparison with the ones in the control group. Cadmium value in female and male urine was higher as compared with the control group. In male patients the differences were statistically significant with the significance level of  $p \leq 0.05$ . In all arterial blood hypertension groups of patients there was statistically insignificant growth of lead and cadmium in blood and cadmium in the urine. The lead value in the urine of the arterial blood hypertension patients of group I appeared to be nonsignificantly higher and in the two other groups the lead value was non-significantly lower as compared with the control group patients (Table 2).

Table 2. Mean contents of lead and cadmium in blood and urine of tested population with regard to period of blood hypertension

Groups		Numerous group (n)	Lead (Pb)		Cadmium (Cd)	
			Value in blood ( $\mu\text{g}/100 \text{ ml}$ ) $\bar{x} \pm SD$	Value in urine ( $\mu\text{g}/1$ ) $\bar{x} \pm SD$	Value in blood ( $\mu\text{g}/100 \text{ ml}$ ) $\bar{x} \pm SD$	Value in urine ( $\mu\text{g}/1$ ) $\bar{x} \pm SD$
Control group		15	$12.80 \pm 9.09$	$22.67 \pm 12.23$	$1.04 \pm 0.51$	$1.99 \pm 1.79$
Tested groups with blood hypertension	Period I	16	$18.0 \pm 13.76$ $c=0.791$	$23.44 \pm 14.89$ $c=0.157$	$1.18 \pm 0.31$ $c=0.920$	$2.97 \pm 2.23$ $c=1.491$
	Period II	11	$15.28 \pm 12.72$ $c=0.551$	$22.45 \pm 5.43$ $c=0.062$	$1.12 \pm 0.35$ $c=0.477$	$3.13 \pm 2.47$ $c=1.417$
	Period III	14	$15.0 \pm 11.24$ $c=0.576$	$20.86 \pm 11.39$ $c=0.388$	$1.11 \pm 0.44$ $c=0.395$	$2.94 \pm 1.81$ $c=1.571$

The acquired medium concentration values of cadmium and lead in blood and urine of the examined population did not exceed hygienic norms.

The role of heavy metals as a releasing factor of material blood hypertension has been an important subject of discussion for many years. In some regions, especially in those of high industrialization, the meaning of those metals is being equally taken into consideration as well as other reasons for arterial blood hypertension. The recent clinical and experimental research of many authors suggests that in some forms of the arterial blood hypertension the role of lead may be highly probable (2, 7). In former research there was no strict correlation to be observed between arterial blood hypertension in people exposed to the lead activity (4). However Berlin et al. showed that arterial blood hypertension is

more frequent in people exposed to a toxic influence of lead than in those who are not exposed (1). The experiments' results of examinations of animals in establishing the role of cadmium in arterial blood hypertension have not been yet univocally acclaimed in epidemiological research on human population (5, 13).

In literature accessible now, the information given by Glauser et al., shows a significant level of elevation of cadmium in blood in people with arterial blood hypertension (6). The results' divergences point out the necessity of conducting further research. Progressive contamination of environment with heavy metals may appear to become a very important issue in prophylactic treatment.

### Conclusions

1. Medium lead and cadmium values in systemic liquids (blood, urine) of the examined population are within the bounds of hygienic norms.

2. The lead and cadmium levels in blood and urine of the examined groups of patients with arterial blood hypertension was non-significantly higher in comparison with patients from the control group, with an exception of lead in urine which showed similarity to the control group.

3. Considering the division of arterial hypertension according to WHO, the statistic increase of lead and cadmium levels in blood and urine in the patients with hypertension did not show to be significant, the exception lead level in the urine in groups II and III as compared to the control group.

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Otrzymano 1992. 01. 29.

### STRESZCZENIE

W przeprowadzonych badaniach oceniano poziom metali ciężkich: ołowiu i kadmu we krwi i moczu wybranej populacji ludzi zdrowych oraz osób z rozpoznaniem nadciśnieniem tętniczym. Badaniami objęto 56 osób, w tym 15 osób zdrowych (grupa kontrolna) i 41 osób z rozpoznaną chorobą nadciśnieniową (grupa testowa). Poziom ołowiu i kadmu we krwi i moczu badanych z grupy testowej był nieznamienne wyższy w porównaniu z grupą kontrolną, z wyjątkiem ołowiu w moczu, gdzie stwierdzono poziom zbliżony do grupy kontrolnej. Uzyskane średnie wartości tych metali w płynach ustrojowych (krwi i moczu) znajdowały się w granicach obowiązujących norm.

