

DETERMINATION OF CHROMIUM, COBALT AND NICKEL IN THE BLOOD OF THE ADULT POPULATION LIVING IN BELGRADE

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The microelements chromium, cobalt and nickel are necessary for the proper functioning of the organism. At higher concentrations, they can cause toxic effects (organ disfunction, genetic damage). They are widespread in the environment. They reach our body through food, water, air and/or skin. The aim of this study was to determine the reference values of chromium, cobalt and nickel in the blood of adult residents of Belgrade and determine the degree of influence of individual, socioeconomic factors and lifestyle habits on blood levels of these metals. The study population consisted of adults, healthy population, 18 to 65 years of age, who were voluntary blood donors. The study included 715 men (72.7%) and 269 women (27.3%). Blood collected in vacutainers with heparin, was used for analysis. 984 samples were analysed. The metals were determined using inductively coupled plasma mass spectrometry (7700x, Agilent, USA), with octopol reactive system and micro-flow nebulizer. The average age of participants was 37.2 ± 10.8 . The reference values of the analysed metals, shown as the 95 percentile, were $0.95 \mu\text{g/L}$, $0.62 \mu\text{g/L}$ and $1.46 \mu\text{g/L}$ for chromium, cobalt and nickel, respectively, and were in good correlation with the values obtained in biomonitoring studies conducted in Europe. This study showed that population of Serbian origin had significantly lower blood concentrations of chromium, that cobalt blood levels in women were significantly higher and cobalt and nickel levels increased with age in both sexes. Education and economic status, cigarette smoking and sports did not significantly affect the levels of these metals in the blood.

ODREĐIVANJE NIVOVA HROMA, KOBALTA I NIKLA U KRVI ODRASLOG STANOVNIŠTVA NA TERITORIJI BEOGRADA

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Mikroelementi hrom, kobalt i nikel su potrebni za pravilno funkcionisanje organizma. U većim koncentracijama mogu ispoljiti toksične efekte poput ometanja pravilne funkcije organa i dovesti do genetskih oštećenja i karcinogeneze. Široko su rasprostranjeni u životnoj sredini. Putem hrane, vode, vazduha i/ili kože dospevaju u naš organizam. Cilj rada bio je da se utvrde referentne vrednosti hroma, kobalta i nikla u krvi odraslih stanovnika grada Beograda, kao i stepen uticaja individualnih, socioekonomskih faktora i životnih navika na nivoe ovih metala u krvi. Ispitivanu populaciju je činilo odraslo, zdravo stanovništvo, ukupno 715 muškaraca (72,7%) i 269 žena (27,3%) od 18 do 65 godina starosti, koji su bili dobrovoljni davaoci krvi. Za analizu je korišćena krv sakupljena u vakutejnere sa heparinom. Analizirano je 984 uzoraka. Koncentracija metala je određena metodom masene spektrometrije sa induktivno spregnutom plazmom (7700x, Agilent, USA), sa oktopol reaktivnim sistemom i „micro-flow“ raspršivačem. Prosečna starost ispitanika iznosila je $37,2 \pm 10,8$ godina. Referentne vrednosti ispitivanih metala u krvi, prikazane kao 95. percentil su $0,95 \mu\text{g/L}$, $0,62 \mu\text{g/L}$ i $1,46 \mu\text{g/L}$ za hrom, kobalt i nikel, redom, su u dobroj korelaciji sa vrednostima dobijenim u biomonitoring studijama sprovedenim u Evropi. Istraživanje uticaja individualnih faktora je pokazalo da je hrom izmeren u značajno nižim koncentracijama kod stanovništva srpske nacionalnosti, da su nivoi kobalta u krvi žena značajno viši i da se nivoi kobalta i nikla povećavaju sa starenjem kod oba pola. Obrazovanje i ekonomski status, pušenje cigareta i bavljenje sportom ne utiču statistički značajno na nivoe ovih metala u krvi.