

Safety awareness concerning lead exposure in the radiology departments of general hospitals

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Abstract

Background: Lead has been one of the most toxic elements in human environment, while environmental lead has been shown to generate significant impacts on the health of the general public. However, environmental lead has not been well studied on those working in the hospitals' departments which are potentially exposed to lead exposure. Safety hospital programs and occupational health settings should include lead surveillance for health literacy of the healthcare professionals.

Methods: A survey on 29 radiologists and radiological technicians, 18 males and 37 females, who have worked more than one year in the departments of radiology and radiation oncology which have installed lead for radiation shielding in 6 general hospitals in the metropolitan Taipei city. Another 26 administration staffs in the same hospitals were recruited as the reference. All were without residential exposure to environmental and occupational lead exposure from their residence, and without hair been dyed, permed, bleached, or straightened for at least 6 months before the sampling. Adequate and only the newest hair growth were sampled and collected from the study subjects. Careful sample preparation were used to remove adhering particles and fluids which may also contain metals, while high resolution inductively coupled plasma-mass spectrometry (ICP-MS) was employed for lead concentrations. Quality control was carried out by repeat re-analysis of pooled hair extracts.

Results: Those worked in the radiology and radiation oncology departments were shown with hair lead ($\mu\text{g per gram}$, 0.62 ± 0.45 ; 95% confidence interval 0.08- 1.79) significantly higher (r^2 11.2%; p value <0.05) than those in the reference (0.32 ± 0.31 , 95% CI 0.004- 0.95), while gender, duration of working in the departments, and ages of these individuals were not shown with significant association.

Conclusion: Significant higher lead concentrations in the hair samples of those worked in the hospital departments which employed lead installation for radiation protective shielding. Health literacy regarding safety procedure, indoor ventilation and replacement of lead shielding, are recommended in occupational safety for healthcare professionals.

Methods

The data was analyzed by linear regression models which lead concentration (ug/g) was dependent variable, age (year), gender (male/female), working period (month), and exposure (no/yes) were independent variables, statistic significant level was set with $p < 0.05$.

Table

	n/mean %/ SD		Lead concentration Mean $\pm$ SD, range	Simple linear regression			Multiple linear regression		
				B(95%CI)	β	P	B(95%CI)	β	P
Age (year) (range 20-58)	34.6	9.7	0.474 $\pm$ 0.415, (0.004- 1.786)	-.009 (-.021, .003)	-.207	.133	-.007 (-.023, .010)	-.157	.414
				R square = 2.4%					
Working period (month) Range (0.20-320)	85.1	86.5	0.474 $\pm$ 0.415, (0.004- 1.786)	-.001 (-.002, .001)	-.104	.455	.000 (-.002, .001)	-.097	.617
				R square = 0.8%					
Gender (n, %)									
Male	18	32.7	0.527 $\pm$ 0.555, (0.025- 1.786)	Reference			Reference		
Female	37	67.3	0.450 $\pm$ 0.339, (0.004- 1.319)	-.077 (-.322, .168)	-.087	.531	-.106 (-.339, .127)	-.120	.366
				R square = 1.1%					
Exposure (n, %)									
No	26	47.3	0.321 $\pm$ 0.311, (0.004- 0.949)	Reference			Reference		
Yes	29	52.7	0.616 $\pm$ 0.453, (0.081- 1.786)	.295 (.081, .508)	.358	.008	.311 (.084, .539)	.379	.008
				R square = 11.2%					
				R square for all factors = 12.2%					

- ➔ The lead of concentration was not associated with age, gender or length of working, but it was associated with whether or not people expose the risk factor. If people expose to risk factor, the concentration of lead in their hair is higher. Exposure alone explain 11.2% of total variance of concentration of lead in people's hair while other three factor just added 1% of the variation.