Exposure assessment of arc welders to extremely low frequency magnetic field: Its relationship with the secretion of paratormone hormone and mood states

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Abstract

Introduction: Nowadays, exposure to extremely low frequency (ELF) magnetic field has been interested in many studies due to possible effects on human physical-mental health. Therefore, this study aimed to assess arc welders' exposure to extremely low frequency magnetic field and to determine its relationship with the secretion of paratormone (PTH) hormone and mood states.

Material and Method: The present study has been conducted among 35 healthy production workers (as exposed group) and 35 healthy administrative personnel (as unexposed group). After checking the work activities of participants according to the guide recommended by the National Institute for Occupational Safety and Health (NIOSH), ELF magnetic fields were measured using an ELF measurement device in the regions including trunk, head, and neck. The plasma levels of PTH hormone of both groups were evaluated by the Electrochemiluminescence method. Stress-Arousal Checklist (SACL) was used to assess the mode states of subjects in both groups. The collected data were analyzed by SPSS software version 16.

Result: There was a significant difference between the exposed and unexposed groups with respect to the exposure level to ELF magnetic fields (P-value<0.0001). Mean PTH hormone level in exposed group (34.54 pg/ml) was lower than unexposed ones (37 pg/ml), however these mean values weren't significantly different (P-value=0.67). Score of "stress" subscale related to the "pleasure" and score of "arousal" subscale related to the "activities and alertness" in the unexposed group were significantly higher than those in exposed group (p<0.0001). Regarding the relationship between exposure level to ELF electromagnetic field and scores of stress, arousal, and PTH hormone level in the two groups, it should be stated that only a significant and positive association was found between the average exposure to ELF magnetic fields and PTH levels in the exposed group (P-value<0.009, r=0.44).

Conclusion: The results of this study showed that continuous welding can be considered as an exposure source to extremely low frequency electromagnetic fields. More accurate and comprehensive laboratory and field studies are needed to prove the hypothesis of the potential impact of extremely low frequency magnetic fields on people's psychological states and mood through changes of parathyroid hormone level.

Keywords: *Arc Welding, Extremely Low Frequency (ELF) Magnetic Field, Mood State, Paratormone Hormone (PTH)*

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