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RISK OF 50/60 HERTZ ELECTROMAGNETIC FIELDS IN ELECTRIC UTILITY WORKERS

Jasminka Batanjac, Elena Ana Pauncu

Institute of Occupational Health, Timisoara, Romania

Summary. *The aim of this examination was to analyze the health risk of electric utility workers professionally exposed to 50/60 Hz electromagnetic fields. The examined group included 81 electric utility workers in Renel, Timisoara (Romania). The control group consisted of 50 workers who have never been exposed to electromagnetic fields. The function systems, the psychomotoric and visual ability were analyzed in both groups before and after the work.*

These results indicate that low-frequency electric and magnetic fields could be contributing factors to the development of cardiovascular, neuroendocrine, psychomotoric and visual disturbances. The preventive measures must be undertaken aiming save the health status of exposed workers.

Key words: *Risk, 50/60 Hz electromagnetic fields, electric utility workers*

Introduction

Technologic advances over the past three decades have resulted in increased development and use of electromagnetic emitting equipment. Today this equipment is used in medicine, industry, research, military systems, and at home, for purposes as diverse as medical diathermy, communication, industrial processing, surveillance and reconnaissance. Not only is more and more equipment being produced, but also the power output is increasing.

Current concern and emphasis of the environment, in addition to low-level effects reported in the literature from other countries, have also contributed to this renewed interest.

Health hazards feared from exposure to low frequency electrical and magnetic fields have been under discussion since at least the beginning of the 1980s. The main apprehensions have concerned the risk of cancer, pregnancy disturbances, leukemia, brain tumors and a so-called electrical hypersensitivity (1-5).

Aim

The aim of this paper is to analyze the influence of 50/60 Hz electromagnetic fields on cardiovascular, neuroendocrine systems, psychomotoric and visual ability at electric utility workers in Renel, Timisoara (Romania).

Methods

The examined group included 81 electric utility workers from Renel, Timisoara (Romania), professionally exposed to low frequency electromagnetic fields (50/60 Hz). The control group consisted of 50 workers who have never been exposed to electromagnetic fields at workplaces. Both groups were similar in structure according to age, sex and length of work history.

The clinical examination before and after work in both groups included: anamnesis, physical examination, ECG, examination of visual functions, reaction time to visual and acoustic stimuli, measuring of blood pressure and skin temperature, and serum concentrations of adrenaline and noradrenaline.

Statistical analysis. Means ±SD are given. Statistical difference was estimated by Student's t-test or Fisher exact test as necessary.

Results and Discusion

The workers of exposed group have had statistically significant more subjective troubles than the workers of control group (Table 1).

Table 1. Subjective troubles during the work at workers of exposed and control group

	Exposed group		Control group		P
	Number	%	Number	%	
Eye's itch	25	30.8	3	6.0	<0.05
Tearful eyes	18	22.2	1	2.0	<0.05
Photophobia	23	28.4	2	4.0	<0.05
Aye's pain	17	20.9	1	2.0	<0.05
Glitter in visual field	15	18.5	1	2.0	<0.05
Sleepiness	59	72.8	5	10.0	<0.05
Irritation	61	75.3	4	8.0	<0.05
Headaches	51	62.4	3	6.0	<0.05
Palpitation	34	41.9	4	8.0	<0.05
Bad memory	21	25.9	1	2.0	<0.05
Unconsciousness	15	18.5	1	2.0	<0.05
Depression	13	16.1	0	0.0	<0.05
Bad hearing	12	14.8	0	0.0	<0.05
Vomiting	13	16.1	1	2.0	<0.05

These symptoms can be a consequence of professional exposure to electromagnetic fields, what is according to the other authors (3, 5).

The mean values of hearth frequency, arterial tension, serum concentration of adrenaline and noradrenaline after the work in the examined group were statistically significant less than the values before the work (Table 2).

Table 2. Mean values of heart frequency, arterial tension, serum concentration of adrenaline and noradrenaline before and after the work in the examined group.

	Before the work	After the work	P
Heart beat	85.1 ± 10.2	69.1 ± 4.3	<0.01
Systolic tension	19.8 ± 5.3	16.4 ± 2.8	<0.01
Diastolic tension	11.9 ± 3.2	8.4 ± 1.8	<0.01
Adrenaline	15.1 ± 8.8	11.6 ± 5.7	<0.01
Noradrenaline	27.1 ± 7.1	20.1 ± 7.8	<0.01

In the control group these changes were not found ($p<0.05$), so that the changes in exposed group can be a consequence of professional exposure to low frequency electromagnetic fields.

The number of oscillation of eye lid and skin temperature in the exposed group after the work were statistically significant higher than the state before the work ($p<0.01$), which were not cases in the control group ($p>0.05$).

The reaction time to visual stimuli in the exposed group after the work was statistically significant higher (33.2±5.0) than the state before the work (20.3±4.0) ($p<0.01$). These changes were not found in the control group ($p>0.05$). The reaction time to acoustic stimuli in exposed group after the work was statistic significantly higher (30.5±2.0) than the state before the work (24.7±3.0) ($p<0.01$). These changes were not present in the control group ($p>0.05$), so that changes in reaction time to acoustic and visual stimuli can be explained by the influence of electromagnetic fields on neurological system of exposed workers.

Conclusion

These results indicate that electromagnetic fields can be a possible contributing factor in the development of cardiovascular, neurological and endocrine system, bring numerous subjective troubles, psychomotoric and visual weakness to exposed electric utility workers.

The medical preventive measures must be undertaken aiming to save the good health status of exposed electric utility workers.

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RADNICI ELEKTRODISTRIBUCIJE EKSPONOVANI RIZIKU ELEKTROMAGNETNOG ZRAČENJA JAČINE 50/60 HZ

Jasminka Batanjac, Elena Ana Pauncu

Institut za Medicinu Rada, Temišvar, Rumunija

Kratak sadržaj: *Cilj rada jeste dokazivanje ugroženog zdravstvenog stanja radnika, profesionalno izloženih elektromagnetnom zračenju jačine 50/60 Hz. U eksponavanoj grupi ispitan je 81 radnik elektrodisribucije Renel u Temišvaru, profesionalno izloženih elektromagnetnom zračenju. U kontrolnoj grupi ispitano je 50 radnika koji nikada u svom radnom veku nisu bili profesionalno izloženi elektromagnetnom zračenju. U obe grupe ispitivana je funkcija kardiovaskularnog i neuroendokrinog sistema, psihomotorika i vizualna sposobnost, pre i posle radnog vremena.*

Dobijeni rezultati pokazuju da niske frekvencije elektromagnetnog zračenja mogu biti uzročnici nastajanja patoloskih promena sto se kardiovaskularnog, neuroendokrinog sistema tiče a takođe mogu nepovoljno uticati na psihomotoriku i funkciju vida. Što se preventive tiče treba preduzeti neophodne mere i sačuvati zdravstveno stanje eksponovanih radnika.

Ključne reči: *Rizik, elektromagnetno zračenje od 50/60 Hz, eksponovani radnici*