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Exposure to Video Display Terminals and Risk of Spontaneous Abortion

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Clusters of spontaneous abortion among video display terminal (VDT) users in North America and Canada in the late 1970s aroused suspicion about the potential risk of an association between VDT exposure and pregnancy outcome. This case-control study considered the association between VDT use and the risk of miscarriage. Cases were 508 women admitted for spontaneous abortion to the Clinica Luigi Mangiagalli and a network of obstetric departments in the Milan area. Controls were 1,148 women who gave birth at term to healthy infants on randomly selected days at the same hospitals where cases were identified. No association emerged between VDT exposure and spontaneous abortion, the estimated odds ratio being 1.0 (95% CI: 0.8–1.2). This evidence agrees with studies conducted in different countries by various authors. Am. J. Ind. Med. 32:403–407, 1997. © 1997 Wiley-Liss, Inc.

KEY WORDS: video display units; risk; spontaneous abortion; case-control study

INTRODUCTION

Some studies on animals and on human cells have suggested that exposure to low-frequency electromagnetic fields (EMF) results in reproductive failure [Nielsen and Brandt, 1990]. Attention has been focused on extremely low frequency (ELF) magnetic fields, taking into account the evidence of the interaction between ELF magnetic fields and biological systems [Adey, 1981].

Extremely low frequency (45–60 Hz) EMFs were found to be associated with spontaneous abortion in two studies that showed a seasonal pattern of abortions in families with electrically heated beds or ceiling cable electric heating [Wertheimer and Leeper, 1989]. Further, clusters of spontaneous abortion among video display terminal (VDT) users in North America and Canada in the late 1970s aroused

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suspicion about the potential risk of an association between VDT exposure and pregnancy outcome.

Analysis of the association between exposure to VDTs and miscarriage is also of interest considering the fact that this exposure may be representative of other comparable EMF sources, such as television, electric typewriters, and domestic appliances, and is common in today's workplace.

To explore further information, we considered data from a case-control study on the association between VDT use in pregnancy and the risk of miscarriage. The specific utility of this study derives from the scarcity of data from Southern Europe, since studies conducted to date refer to Northern Europe (Finland, Denmark, Sweden, the UK) or to the USA and Canada.

MATERIALS AND METHODS

The general design of this study has been described [Parazzini et al., 1994]. Between June 1992 and May 1995 trained interviewers identified and questioned cases and controls using a structured questionnaire.

Cases were 508 women (median age 33 years, range 17–44) admitted for spontaneous abortion (within the 12th week of gestation) to the Clinica Luigi Mangiagalli (the largest obstetric hospital in Milan) and a network of obstetric departments in the greater Milan area. All miscarriages were



TABLE I. Distribution of 508 Cases of Spontaneous Abortion and 1,148 Controls According to Age and Selected

 Factors. Milan, Italy, 1992–95

	Spontaneous abortions No. (%)	Controls No. (%)	OR (95% Cl)	
			MH*	MLV**
Age (years)	68 (13 3)	152 (13.2)		
<25	1/2 (29.1)	A74 (41 3)		
25–29	143 (20.1)	380 (33.1)		
30–34	127 (27.0)	142 (12 4)		
≥35	(37 (27.0)	142 (12.4)		
Education (years)	100 (00 0)	A19 (26 A)	1+	1+
≤10	193 (38.0)	410 (30.4) 730 (62.6)	0.8 (0.6–1.0)	0.9(0.7-1.1)
≥11	315 (62.0)	730 (03.0)	0.0 (0.0 1.0)	0.0 (0.1 11.1)
Marital status		111E (07 1)	1.1.	1+
Married	451 (88.8)	1115 (97.1)	1 T	15/28-72)
Unmarried	57 (11.2)	33 (2.9)	4.4 (2.0-7.0)	4.0 (2.0 1.2)
Previous spontaneous abortions		054 (00 4)		1.4
0	347 (68.3)	954 (83.1)	1+	10(15.25)
≥1	161 (31.7)	194 (16.9)	1.9 (1.5–2.4)	1.9 (1.3-2.3)
Live births				4.1
0	273 (53.7)	658 (57.3)	1+	1+
1	156 (30.7)	396 (34.5)	0.7 (0.6–0.9)	0.7 (0.6-1.0)
≥2	79 (15.6)	94 (8.2)	1.1 (0.8–1.6)	1.0 (0.7-1.4)
χ_1^2 trend				$1.296 \mathrm{p} = 0.255$
Occupation				
Professional/technical	114 (22.5)	200 (17.4)	1+	1+
Employee	224 (44.2)	578 (50.4)	0.9 (0.7-1.2)	0.8 (0.6–1.1)
Blue-collar worker	69 (13.6)	135 (11.8)	1.4 (0.9–2.1)	1.0 (0.6–1.7)
Housewife	90 (17.7)	217 (18.9)	1.0 (0.7–1.4)	0.8 (0.6–1.2)
Student/unemployed	10 (2.0)	17 (1.5)	1.8 (0.8–4.3)	1.5 (0.6–3.7)
Alcohol consumption in the first trimester of pregnancy				
No	273 (53.8)	771 (67.2)	1+	1+
Vec	235 (46.2)	377 (32.8)	1.6 (1.3–2.0)	1.4 (1.1–1.8)
Coffee intake in the first trimester of pregnancy				
No	137 (27.0)	494 (43.0)	1+	1+
NU	371 (73.0)	654 (57.0)	1.8 (1.4–2.3)	1.6 (1.3–2.1)
res Creating babits in the first trimester of pregnancy				
	408 (80.3)	994 (86.7)	1+	1+
NO	100 (19 7)	153 (13.3)	1.6 (1.2-2.2)	1.2 (0.9–1.7)
Yes	100 (10.7)	100 (1010)		

OR = odd ratios; CI = confidence interval.

*MH: Mantel Haenszel estimates adjusted for age.

**MLV: Multiple logistic regression equations estimates including terms for the above variables.

usage found a small increase in risk, but the finding was not significant.

Lindbohm et al. [1992] reported a significant risk (OR 3.4; 95% CI: 1.4–8.6) associated with VDT units with a high level of ELF magnetic fields (>0.9 microTesla) compared to VDT units with a lower level (<0.4 microTesla). This conclusion was drawn on the basis of a direct laboratory measurement of equipment and on self-reported exposures for a relatively small subsample (22% of cases and 10% of controls). In the present study, no direct measurements of emitted magnetic fields were planned or done.

The lack of association in our study might be related to three factors: the possibility of bias, the limitation of cases to clinical miscarriages, and the definition of exposure. Recall bias is unlikely because it implies that the women who experienced spontaneous abortion would have underreMcDonald AD, McDonald JC, Armstrong B, Cherry N, Nolin AD, Rober D (1988): Work with visual display units in pregnancy. Br J Ind Med 45:509–515.

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