

SICKNESS ABSENCE FROM 1978 TO 1992 OF ELECTRICITE DE FRANCE (EDF) WORKERS EXPOSED TO ELF-EMF :

The substation group

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INTRODUCTION

Electromagnetic fields are suspected of many health effects, including cancers, immunity and fertility disorders, congenital malformations, suicides and depression... (1-2). Although the results of all studies are contradictory and no biological mechanism has been found, populations are concerned about this matter.

This study analyses the absence from work of some EDF employees who are *a priori* the most professionally exposed to ELF EMF. Absence from work is taken as an health indicator. Although it is not specific, it can be predictive of serious health problems (3). The specific context of EDF has made it possible to collect and analyse the medical aspect of absence from work, that is rare in France.

We were interested with employees working with high voltage (over 90 kV). Three job categories have been selected : live line workers, substation maintenance workers and substation exploitation workers (called in the company the ATEX). The first group concerned the live linemen and the results were exposed previously (4,5). It appeared they had more accidents at work, but this was more related to the job of lineman rather than to the EMF exposure. Nevertheless, substation workers have an exposure less intensive but longer than live linemen. We present here the result about the absenteeism of the substation workers, maintenance and exploitation.

OBJECTIVES

The objective of this retrospective longitudinal study is to describe the profile of absence from work for medical reasons for the substation workers, maintenance and exploitation, over a period of 15 years (1978-1992), and then to compare it with a representative sample of EDF GDF employees, of same age and sex, and for the same period (reference group).

Cancer pathology is not the aim of the study, because of its rarity in this young selected population. But we were particularly attentive to the psychiatric disorders.

POPULATION

The EDF generation and transmission department, which deals with all the employees concerned by high voltage, have 34 operational sub-groups. Each of them includes :

- a maintenance substation team, also about 15 persons. That is about 500 persons each year concerned by the study,
- four or five substation grouping, each with 7 or 8 ATEX (substation exploitation workers). That is about 1100 persons each year concerned by the study.

The substation maintenance workers are exposed to EMF, with an average occupational exposure of about 35 μ T. The ATEX may be particularly exposed, especially in term of duration, when they live at their place of work. This was the case for two-thirds of them in 1992.

METHODOLOGY

To be included in the study, workers must be men, having worked for at least one year accumulated either in a live line team, a substation team or as ATEX, in the EDF generation and transmission department, between 1978 and 1992. A subject remains in the exposed group even if he leaves the exposed job. The absenteeism is taken into account up to 31 December, 1992 or to his departure of the company, by retirement or by resignation (but this event is rare, 0.05% per year). All employees who have left the exposed job before 1978 have been excluded from the study.

The substation group included the substation workers (maintenance and exploitation) and subjects having worked either simultaneously or consecutively on both lines and substations.

A reference group had been chosen, at random, from all the EDF GDF non-management male employees, one reference subject for each exposed worker, matched on the first year of employment.

For each person included in the study, his job history and his socio-demographical data for 1993 were extracted from the employees data base. The epidemiological data base of the Service Général de Médecine de Contrôle, who manages the social security of the company, supplied the absence data : number of absences with the date, duration of absences, and diagnoses if they are known. Mortality data (death during occupational life), long term illness and invalidity data were also available.

The socio-professionnal data were analysed using *Epi Info* software in the Service des Etude Médicales, to compare the exposed and the reference groups. The absenteeism data were analysed using *SAS* software in the Service Général de Médecine de Contrôle, with the method of person x years. The tests used are *Chi2* and *Student*.

RESULTS

The substation group is composed of 2327 persons exposed from one year or more, divided into 685 maintenance substation workers, 1121 ATEX and 521 mixed workers (maintenance and/or exploitation). Among these exposed workers, 243 (10.4%) no longer had an exposed job in 1992, and 289 (12.4%) had left the company.

Their average length of work in the company was 17.8 years (from 1 to 44 years) and their average length of exposure was 11.8 years (from 1 to 37 years). These 2327 persons correspond to 22168 persons x years.

In 1993, the socio-demographical data, which could influence the absenteeism, were comparable between the exposed and the reference group : they had the same mean age (41 vs 41.3 years old) and a similar distribution into the different matrimonial situations (unmarried, married or co-habited, separated or divorced, widowed). The exposed workers had more children than the reference workers, but this factor concerns more the female absenteeism than the male absenteeism.

The absenteeism of the exposed group is significantly less important than that of their referees ($p < 1\%$) (table 1) : there are less substation workers who stop work (34.5% vs 38.9%), they are absent less often (1.46 vs 1.67 absence in a year) and their absences are shorter in duration (21 days vs 23.3 days). But the absenteeism is different if substation maintenance or substation exploitation workers are considered : substation exploitation workers (ATEX) have a less significant absence rate than their referees (1.45% vs 2.33%); substation maintenance workers have an absence rate over their referees (3.03% vs 2.6%) because there are more exposed people who take sick leave but they take it less often than their referees.

The medical diagnoses (table 2) are also significantly different : sick leaves for psychiatric (2.1% vs 4.1%) and respiratory (13.4% vs 15.3%) diseases are less frequent in the exposed group than in the reference group. On the other hand, sick leaves for accidents at work are more frequent in the exposed population (7% vs 4.5%).

CONCLUSIONS

The substation workers have better health indexes than their referees, and it is not very surprising because they are carefully selected to do this job. But the differences are less important between the substation workers and their referees than those between the live linemen and their referees.

No pathology, which has been described as possibly linked to electromagnetic fields, has appeared through the medical absenteeism surveillance in our study.

Tables 1 : Absences variables

	exposed	referees	p
Absence rate	1.98%	2.49%	p<1‰
Percentage of employees absent at least once	34.5%	38.9%	p<1‰
Average annual number of sick leaves per employee absent	1.46	1.67	p<1‰
Average duration of an sick leave	14.4 days	13.9 days	
Average annual duration of sick leave per employee absent	21 days	23.3 days	p<1‰

Table 2 : Medical conditions (number of absences during the study period)

	exposed (%)	referees (%)
Psychiatric	239 (2.1)	588 (4.1)
Respiratory	1490 (13.4)	2205 (15.3)
Digestive	436 (3.9)	627 (4.3)
Cardiovascular	168 (1.5)	201 (1.4)
Osteoarticular	743 (6.7)	1032 (7.2)
Accidents at work	778 (7)	653 (4.5)
Accidents outside work	875 (7.8)	1060 (7.4)
Urinary and Genital	125 (1.1)	189 (1.3)
Other diagnoses	675 (4.9)	1049 (6)
Diagnosis unknown*	5745 (51.5)	6966 (48.4)
Total	11149 (100)	14381 (100)

p < 1‰

*Sickleaves non controlled by the doctors of the Service Général de Médecine de Contrôle

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