

Xerox Workers: Hidden Health Hazards in Visakhapatnam

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Nat. Env. Poll. Tech.
ISSN: 0972-6268
www.neptjournal.com

Key Words:

Xerox workers
Health hazards
Sick building Syndrome

ABSTRACT

A population-based cross-sectional study was carried out in coastal zone of Visakhapatnam among 170 workers in 41 randomly selected Xerox (photostat) shops. The aim was to evaluate the relations between work with Xerox equipment and the occurrence of eye, nasopharyngeal, skin and general symptoms (often denoted as sick building syndrome (SBS), chronic respiratory symptoms, and respiratory infections. Work with self-copying paper was significantly related to weekly work-related eye, nasopharyngeal and skin symptoms, headache and lethargy, as well as to the occurrence of wheezing, cough, mucus production, sinusitis, and acute bronchitis. Xeroxing was related to nasal irritation, and video display terminal work to eye symptoms, headache, and lethargy.

INTRODUCTION

The nature of work has been in a phase of change, and today a large proportion of the workforce works under indoors environment. This trend is likely to continue in the future, and exposures in this environment influence the health, well-being and productivity of more and more employees. Some case reports and a few studies have suggested that some common environment exposures, such as exposure to carbonless copy paper (CCP) (Shehade et al. 1987, Skov et al. 1989, Kanerva et al. 1993, Jaakkola & Jaakkola 1999) and fumes from Xerox machines photocopiers and printers affect health adversely (Skov et al. 1989, Jaakkola & Jaakkola 1999, Yassi et al. 1988, Fisk et al. 1993, Stenberg et al. 1993), whereas some reviews have challenged this view (Buring et al. 1991, Graves et al. 2000). Employees often raise health concerns related to exposure to paper dust, in general, but only one Swedish study has previously investigated this exposure and sick building syndrome (SBS) symptoms (Hellgren et al. 2002). Another study assessed exposure to a paper index that combined use of different types of paper, such as CCP, carbon paper, printer paper and Xeroxing paper (Stenberg et al. 1993, Stenberg et al. 1994). Apart from a study by Jaakkola & Jaakkola (1999) no other study has assessed occurrence of respiratory infections in relation to such office exposures. The objective of this study was to assess the relation between exposure to CCP, paper dust and the occurrence of related health affects like chronic respiratory symptoms, respiratory infections and health effects in a population-based cross-sectional study of professionals, clerks and administrative personnel in Visakhapatnam.

Xerox machines and laser printers are safe when used occasionally and serviced regularly. But if they are badly positioned, poorly maintained and used frequently or for long runs, there are risks to health, ranging from irritated eyes, nose and throat to dermatitis, headaches, premature ageing and

reproductive and cancer hazards. Proper ventilation and maintenance are essential in eliminating hazards.

CHEMICALS THAT ARE RELEASED AND HARMFUL TO HEALTH

Ozone: It is a gas produced during the high voltage electrical discharge in photocopiers and laser printers. It is sweet smelling and highly toxic. Health effects are eye, nose, throat and lung irritation, and dermatitis. It can have an effect on the central nervous system.

Volatile organic compounds: They are also emitted during xeroxing. These can contain traces of decane (carcinogenic), 1,1,1-trichloroethane (can cause skin irritation), iso-octane, toluene (causes fatigue, drowsiness, throat and eye irritation, xylene (can cause menstrual disorder and kidney failure) and benzene (carcinogenic and teratogenic).

Selenium and cadmium sulphide: Some copiers use a drum impregnated with selenium or cadmium sulphide. The gas emitted from these materials, especially when hot, can cause throat irritation and sensitization (i.e., adverse reaction to very tiny quantities of chemical) to exposed workers. Short term exposure to high levels of selenium by ingestion causes nausea, vomiting, skin rashes and rhinitis.

Nitrogen oxide: May be produced when there is a spark in electrostatic photocopiers. Symptoms are similar to those produced by carbon monoxide.

Carbon monoxide: It is produced when toner (containing carbon black) is heated in an inadequate air supply. In poorly ventilated conditions the effects include headaches, drowsiness, faintness and increased pulse rate. Carbon monoxide can cross placenta and affect the unborn child.

Toners: Toners are generally a mixture of plastic resin and carbon black often with other additives. Carbon black is classified as a nuisance dust (i.e., is only mildly toxic in itself) but will contain impurities known to be carcinogens. Toners should be handled with care, protective gloves should be worn, and dust release minimised. Contact with the tongue, e.g., by touching copied papers with a wetted finger can lead to small growths on the tongue. Other health effects may be irritated eyes, headache and itching skin. Maintenance workers are at risk from repeated exposure which can lead to skin and eye sensitization.

Ultraviolet light: Photocopier lids should be kept closed when the machine is in use. Ultraviolet light can cause eye irritation and burns.

Noise: Can reach up to 65dB (A) for ordinary copiers. Care should be taken in siting copiers with noisy collators as far from workers as possible.

Fire: Excessive dust in electrical equipment will cause sparking. Provision of carbon dioxide extinguishers near machines is essential.

Jams: Even though most machines cut out when opened, they should be switched off before removing jammed paper. Avoid hot surfaces and wash hands immediately afterwards.

MATERIALS AND METHODS

A population-based cross-sectional study of adults of working age was conducted. The source population consisted of adults of 15-40 years of age, living in a geographically defined area of Visakhapatnam. The study subjects answered a self-administered questionnaire. The questionnaire had three sections:

1. Personal characteristics
2. Health information including respiratory symptoms, symptoms of SBS, respiratory infections, and previous respiratory and allergic diseases
3. Questions related to dietary information

Section 2 inquired about current occupation and previous occupations throughout the working history.

RESULTS AND DISCUSSION

Table 1 depicts the personal data of the respondents like age, number of years of working, etc. It was observed that most of the working groups were from the age group of 15-25 years (72) followed by 35-45 years (50) and least being 25-35 years (48).

The study showed that the number of years of working were proportional to the health effects of

Table 1: The personal details of respondents.

| S.No~ | Parameter | Respondents | |
|-------|-------------------|-------------|----|
| 1 | Age Group (Years) | 15-25 | 72 |
| | | 25-35 | 48 |
| | | 35-45 | 50 |
| 2. | Years of working | 2-4 | 67 |
| | | 5-7 | 75 |
| | | 7-10 | 28 |

Table 2: Previous and present health strategy of respondents.

| Parameter | Respondents |
|------------------------------|-------------|
| Previous health effects | 65 |
| Respiratory problems | 50 |
| Allergies | 45 |
| <i>Present Health Status</i> | |
| Symptoms of SBS | 120 |
| Respiratory infections | 95 |
| Allergies | 106 |
| Regular cough and cold | 88 |
| Headaches | 92 |
| Fatigue | 86 |

Table 3: The dietary habits of respondents.

| S.No.~ | Parameter | Respondents |
|--------|-----------------|-------------|
| 1 | Home based food | 120 |
| 2. | Outside food | 50 |
| 3. | Vegetarians | 55 |
| 4. | Non-vegetarians | 115 |
| 5. | Milk consumers | 130 |
| 6. | Egg consumers | 145 |

the respondents and maximum respondents were having 5-7 years of working (75) which were also in the age group of 15-25 years. The respondents with 2-4 years (67) of working who were next have shown the initial symptoms of headache, effect on eyes, hair fall and sleeplessness. And least being the respondents with 7-8 (28) years of working, which may be attributed to the SBS (sick building syndrome).

Table 2 depicts the information regarding the health status of the workers, which was observed to be high in people working for more than 5 years. And it also revealed that the health effects have increased after taking up the present occupation, which was evident with the previous health data of the respondents. The health effects were shown as a combination of two and more. Most of the respondents suffered with the sick building syndrome, which was shown after 5 years of working. This was as a result of effects in combination (Morgan & Camp 1986). As a control (data not shown) the data from the workers handling advanced automatic machines were also surveyed who have shown comparatively less effects other than the general weakness, pains of hands and legs, etc.

The respiratory effects were one of the dominating among the discussed, which in some cases have lead to allergies and asthma. Headaches have been very commonly observed along with regular cough and cold. The overall result showed that the effects were severe as the combination of these

increases more than four (LaMarte et al. 1988).

Table 3 shows the dietary habits of the respondents. The main objective of collecting the diet data was to evaluate the health status of the respondents along with his/her previous health data. Diet has always been considered as the governing factor of the health and the present study revealed that almost all the respondents had a healthy diet and, thus, the possible health effects might be due to the exposure to xerox machines.

CONCLUSION

This study has provided new evidence that exposure to paper dust and to FPP in xeroxing environments increases the risk of headache and fatigue, chronic breathlessness, and chronic bronchitis. It also provides evidence that the risks of tonsillitis and middle ear infections are higher in employees exposed to these sources. Exposure to CCP is also associated with increased risk of eye symptoms and diarrhoea, suggesting that direct contact of fingers, after touching CCPs, with eyes and mouth may be an important exposure route. Irritative and neurotoxic effects seem to have importance as mechanisms, but immunological reactions cannot be excluded and they can be operating as well. The study suggests that reduction of these exposures in office work environments is likely to improve the health of office workers. The measures that can be introduced to reduce the exposures include reduced handling of the sources of exposure, improved ventilation where such handling is necessary and locating printers and photocopiers away from working areas.

REFERENCES

- Buring, J.E. and Hennekens, C.H. 1991. Carbonless copy paper: A review of published epidemiologic studies. *J. Occup. Med.*, 33: 486-95.
- Fisk, W.J., Mendell, M.J. and Daisey, J.M. 1993. Phase 1 of the California healthy building study: A summary. *Indoor Air*, 3: 246-54.
- Graves, C.G., Matanovski, G.M. and Tardiff, R.G. 2000. Carbonless copy paper and workplace safety: A review. *Regul. Toxicol. Pharmacol.*, 32: 99-117.
- Hellgren, J., Lillienberg, L. and Jarlstedt, J. 2002. Population-based study of noninfectious rhinitis in relation to occupational exposure, age, sex and smoking. *Am. J. Ind. Med.*, 42: 23-28.
- Jaakkola, M.S. and Jaakkola, J.J.K. 1999. Office equipment and supplies: A modern occupational health concern? *Am. J. Epidemiol.*, 150: 1223-1228.
- Kanerva, L., Estlander, T. and Jolanki, R. 1993. Occupational allergic contact dermatitis caused by diethylenetriamine in carbonless copy paper. *Contact Dermatitis.*, 29: 147-51.
- LaMarte, F.P., Merchant, J.A. and Casale, T.B. 1988. Acute systemic reactions to carbonless copy paper associated with histamine release. *JAMA*, 260: 242-244.
- Morgan, M.S. and Camp, J.E. 1986. Upper respiratory irritation from controlled exposure to vapor from carbonless copy forms. *J. Occup. Med.*, 28: 415-19.
- Shehade, S.A., Beck, S.A. and Chalmers, R.J.G. 1987. Allergic contact dermatitis to crystal violet in carbonless copy paper. *Contact Dermatitis.*, 17: 310-326
- Skov, P., Valbjorn, O. and Pedersen, B.V. 1989. Influence of personal characteristics, job related factors and psychosocial factors on the sick building syndrome. *Scand. J. Work Environ. Health.*, 15: 286-95.
- Stenberg, B., Eriksson, N. and Hououg, J. 1994. The sick building syndrome (SBS) in office workers. A case-referent study of personal, psychosocial and building-related risk indicators. *Int. J. Epidemiol.*, 23: 1190-7.
- Stenberg, B., Mild, K. and Sandstorm, M. 1993. A prevalence study of the sick building syndrome (SBS) and facial skin symptoms in office workers. *Indoor Air*, 3: 71-81.
- Yassi, A., Warrington, R.J. 1988. Allergic eye reaction to photocopier chemicals. *J. Occup. Med.*, 30:457-458.