

OCCUPATIONAL RISK ASSESSMENT IN A BAKERY UNIT FROM THE DISTRICT OF SIBIU

— research paper —

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Abstract: as quality standards in food industry focus on food safety and security, health and security at work continues not to be optimally administrated by a rigorous risk management, this industry being considered light industry. In the present paper we emphasized on the importance of occupational risk assessment in exposed workers from a significant bakery unit of Sibiu. Quantitative determination of risk factors showed high values for temperature (28.7°C) and flour dust (2.32 mg/m³) in the workplace atmosphere. The physical oversteering on locomotion consists in reiterative movements and orthostatic preponderant work, while the three shifts/day working time represents the peculiarity in this industrial sector. We conclude that these employees (bakers, pastry workers) are exposed to significant occupational risks. There is limited data in national statistics of a certain occupational or occupation related pathology in this field.

Keywords: bakery, occupational risk, management, quality

INTRODUCTION

The concept on food quality has occurred in the context of promoting a health life style, in order to prevent cerebro- and cardiovascular diseases, neurodegenerative diseases (Alzheimer, Parkinson), proliferating tumors, toxic infections, food allergies, obesity, diabetes, gout. Agriculture and industrialization have changed the composition of food resources by generating highly processed and refined foods which were shown to be involved in diseases of modern civilization. White bread and pastry products are highly and medium processed foods, with a negative impact on the health

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of consumers (Tentori et al., 2008). Processing in bakery industry generates diverse risks on exposed workers along the whole chain of production. The main risk is represented by the flour dust allergenic potential on bakers and pastry workers genetically predisposed to allergies. In this professional branch some of the following disturbances may occur: bronchial asthma, allergic rhinitis, allergic bronchi-alveolitis, reactive airway syndrome (Todea, 2007). Classification of respiratory sensitizing substances showed flour situated on the second place, after isocyanides (Guidelines on Occupational Asthma, Health and Safety Authority, 2008). Occupational exposure is neglected in the majority of cases, so that such diseases are neither declared, nor paid as professional diseases.

Risk assessment is important in this industrial field for the application of appropriate prophylactic technical and medical measures.

MATERIALS AND METHODS

The study has been taken in a bakery unit with two sectors: bakery and pastry, for the baker and pastry worker trade.

We evaluated the following workplaces: loading mixer, dough mixing, modeling-dividing, dough rolling machine (pastry), Polin furnace, LF furnace, Wachtel furnace (pastry), slice making machine.

The working program is 8 hours/day, in 3 shifts.

We used the following methods of investigation:

1. Observation method (identification of risk factors);
2. Guidelines for risk assessment (including check-list) (Guideline on Risk Assessment, 2007);
3. Occupational noise measurement with digital sound meter Quest-2800. The maximal threshold admitted by our national legislation is 87 dB(A) (OM 380/03.05.2006);
4. Microclimate measurement with Testo digital case (temperature, air stream speed, humidity). The maximal thresholds admitted for medium physical effort activities (metabolism $117 < M < 234$ W) are: temperature 28°C, air stream speed 1 m/s, and relative humidity not exceeding 60% (General Work Safety Regulations, 2002);
5. Flour dust measurement (breathable fraction) with digital Casella device. According to Romanian legislation the threshold admitted value for the flour dust-breathable fraction is 0.5 mg/m³ air (OM 332/17.05.2007);

6. Carbon monoxide concentration measured with Dräger electrochemical sensor device. The threshold admitted value is 20 mg/m³ air (OM 845/13.10.2006).

The measurements were done at the Department of Occupational Health and Laboratory of Industrial Environmental Toxicology, Authority of Public Health and included devices according to European quality standards.

RESULTS AND DISCUSSION

The identified occupational risk factors for bakers and pastry workers coming from the studied enterprise are presented in Table 1.

Table 1. Occupational risk factors investigated in employees from the selected bakery unit.

Type of agent	Risk factor	Workplace
Physical	noise, high temperature	nearby furnaces
Physical-chemical	flour dust (suspension particles)	
Chemical	carbone monoxide	furnaces on gas
Physical oversteering	orthostatic position at work (static effort) weight manipulation (dynamic effort) reiterative movements of apprehension or extension of hand on forearm up rotation movements to those who introduce bread into the furnace (reiterative movements of adduction or flexion and down-up rotation of hand and fist to those who prepare pastry products)	specific
Neuro-psycho-sensitive oversteering	through alternating shifts	Section with alternating shifts
Possible work accidents	mechanic and electric injuries, burning, scalding, hitting, cutting, pricking	specific

Quantitative assessment has been done for noise, microclimate, flour dust and carbon monoxide, and the records are as follow:

1. Mean value of integrated noise during technological process was 68.4 dB(A). We recorded 83 dB(A) at slice making machine, with maximal value 92.6 dB(A).
2. In both bakery and pastry hall microclimates, conditions were similar: (i) temperature= 28.7°C; (ii) air stream speed= 0.6m/s; (iii) relative humidity= 34%.
3. Mean value of flour dust concentration (breathable fraction) was 0.86 ± 0.75 mg/m³ air. A maximum value of 2.32 mg/m³ air was recorded in pastry hall during the operation of loading mixer. The distribution of flour dust values is illustrated in Figure 1.
4. Mean value of carbon monoxide concentration was 11.21 ± 8.70 mg/m³ air. The highest concentration was registered in the proximity of LF furnace from the bakery hall (19.72 mg/m³). The distribution of carbon monoxide values is illustrated in Figure 2.

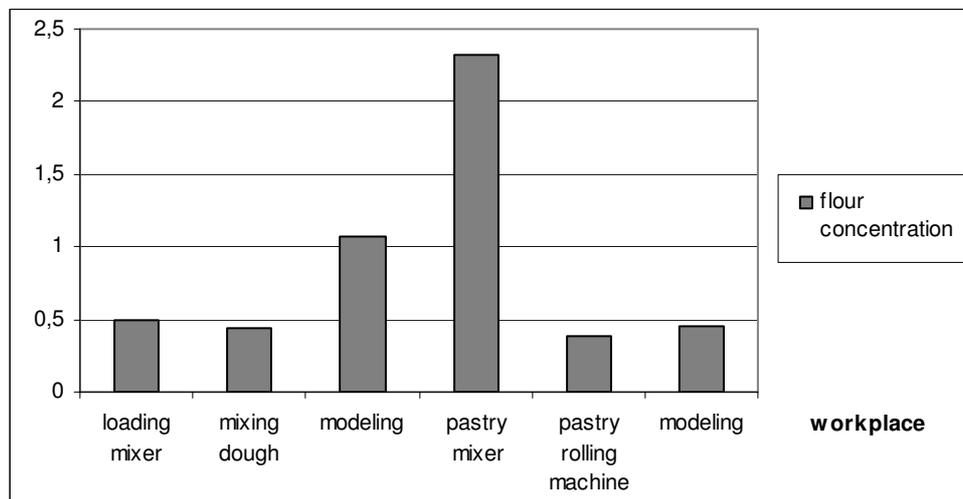


Figure 1. Distribution of flour dust values as function of specific workplace

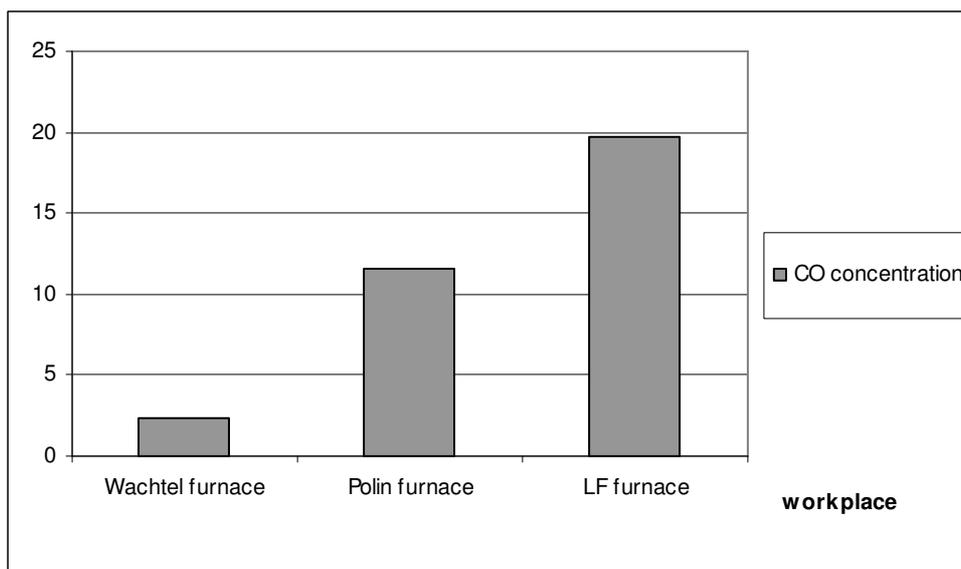


Figure 2. Distribution of carbon monoxide values as function of specific workplace.

The existing risks in bakery and pastry sections may affect workers' health by inducing professional diseases or profession related diseases, as well as may worsen the pre-existent illnesses. In the selected employees the following possible professional diseases could develop: allergic rhinitis, bronchial asthma, allergic bronchi alveolitis (pneumonia by hypersensitization), reactive airway syndrome, carpal or cubital tunnel syndrome done by reiterative movements, sciatic nerve compression syndrome done by vicious positions of the body, venous chronic legs disease done by prolonged orthostatic work associated with weight manipulation, effort thrombophlebitis on arms, hand joints' pathology, caloric collapse, caloric cramps, caloric shock through exposure to high temperatures (warm microclimate). Baker/pastry worker trade related diseases are arterial hypertension, ischemic cardiac disease, chronic unspecified respiratory diseases, digestive diseases and musculoskeletal disorders.

Risk management requires prophylactic technical and medical approaches. Technical prevention should be realized by the employer and consists of reducing the concentration of flour dust in the air of workplaces, introduction of automatic processings, avoidance of heat in workplaces, adequate ventilation of workspaces, individual protection equipment for employees,

sanitary filters and not at least, ergonomically measures. Medical prophylaxis is realized in occupational health services and consists in active supervision of workers' health.

According to the national law, the health and security measures in workplaces are compulsory for each employer (OM 646/26.06.2006).

CONCLUSIONS

The workplaces from the bakery unit selected for the present study are characterized by dry and warm microclimate, and by high concentrations of flour dust in suspension.

Our investigation showed increased values of flour dust in pastry section, during loading mixer with the maximum value of 2.32 mg/m³ air.

We recommend a periodical control of gas installation at the three furnaces and optimization of ventilator system in the production halls.

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