



WorkOSH

Workplace Occupational Safety and Health

An Official Newsletter of ENVIS-NIOH

Vol. 12, No. 4
Oct. - Dec.
2017

ISSN:2393-8943

OCCUPATIONAL HEALTH & SAFETY IN FOOD INDUSTRY

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Introduction

Occupational safety and health (OSH) problems of the food industry have not been generally perceived as a serious issue in the same way as other industries such as healthcare, transportation, mining, and construction sectors. Statistics from various countries show that OSH issues from the food sector have one of the worst records in the manufacturing industries [1,2]. There are also evidences that some OSH aspects in the food industry are getting worse. Despite global economic declines in the recent years, the food and drink businesses have continued to expand in response to the growing worldwide demands for processed foods and drinks [1,2]. In this context of expansion and intensified competition, the food industry has experienced rationalization, restructuring, and a high level of mechanization, in both the industrialized and developing countries [1,2]. As a result, the overall worldwide employment levels in the sector have continued to expand, particularly in the highly capital-intensive drink industry. Moreover, mechanization has often had the effect of increasing the work volumes and the resulting stress levels of workers, as well as increasing the number of monotonous and repetitive tasks, with a consequent rise in the incidence of musculoskeletal disorders (MSDs).

Increased automation has also been accompanied by higher noise levels, which has led to more workers suffering from hearing impediments [3]. Other common OSH problems in the food industry arise out of handling sharp cutting tools, exposing dusts in the air, contacting with infected animals and increasing use of hazardous chemicals [3].

Governments, employers and employees in the food industry are naturally attempting to respond to the above problems as best they can [4]. In many countries, safety and health codes have been adopted for the food industry, as a complement to the more general safety and health legislation [4]. Particular efforts have been made in a number of countries for the essential area of collection and dissemination of information and research, including establishment of data banks on the use of hazardous substances [4]. As a result, workers and employees in the food industry are undoubtedly in a good position to identify OSH problems, as well as to suggest solutions. Hence, it is vital for the employers and employees in the food industry to be able to contribute and maintain their knowledge and competence to improve workplace safety and health issues.

INJURIES IN THE FOOD & BEVERAGE INDUSTRY

It is generally assumed that the injuries incurred in the food and beverage industry are relatively inconsequential. However, facts show that two million workers employed in these operations do have dangerous jobs.

Food service operations have accident and illness rates as high as industries that are commonly thought of as being hazardous places to work. These operations, like any other, present a number of hazards that can result in accidents, injuries and illnesses.

Stressful and hazardous work environments in the food and beverage industry lead to bruised knuckles and minor cuts that reduce production rates and heighten production errors. Human error frequently results from working under hot, noisy and extremely fast-paced conditions which are ever present in many food and beverage operations.

Sprains and strains account for most lost-time injuries. Floor surfaces, knives, hot water, containers, metal stock and conveyors were the primary causes of all injuries.

Because of the dangers involved in the food and beverage industry, it is essential that accident safety records are properly taken and are analyzed by safety personnel so meaningful accident prevention methods can be established [5].

HEALTH AND SAFETY IN THE FOOD AND BEVERAGE INDUSTRY

Workers in this industry are exposed to a wide range of hazards which include the following:

- Same level falls, which are often caused by slippery conditions, can result in sprains and strains.
- Exposure to sharp instruments such as knives.
- Collision with internal transport such as forklifts and containers.
- Lifting, repetitive work and work posture injuries. Workers in this industry can be exposed to heavy manual lifting and repetitive work, as well as poor work posture which is often resulting from inadequate workspace and poor design of the process flow.
- Exposure to noise.
- Exposure to biological hazards. Exposure to biological and microbiological agents may be associated with inhalation and ingestion of dust as

well as working in high levels of humidity. This dust may be from ingredients used during processing and the high levels of humidity may cause skin irritations.

- Exposure to chemical hazards. Exposure may be from chemical handling activities which may include cleaning operations and disinfection of process areas.
- Exposure to heat and cold. This industry can create changing temperature conditions from activities such as heat treatment, chilling and freezing. Workers may be exposed to heat during pasteurization and canning processes and exposed to cold conditions in refrigerant areas.
- Work in confined spaces. Some examples in this industry are: storage tanks and bins, pits and sumps, fuel tanks, grape presses and crushers, fermentation tanks and vessels [6].

Risk Characteristics

The food industry covers a highly diversified range of activities. Although some concerns and risks are common to the whole sector, others are more specific to certain branches of the industry. One of the general factors shared by all branches of the food industry is that they are required to follow strict health and hygiene standards, since their products can affect the health of consumers [4]. For example, at the initial stage of food processing, raw materials must be thoroughly washed, whilst workers have to observe personal hygiene rules such as hand washing, protective clothing and personal cleanliness. As a result of these rules, workers keep their hands constantly in water, which may gradually affect the nerves of their hands and arms. The constant use of water in the workplace also means that the floors and floor coverings are likely to be wet, with a consequent increase in the risk of slip and fall incidence.



Fig.1. Slips and Trips due to constant use of water in the workplace [15].

Another common vocational feature of the food industry is that workers are engaged in the processing and transformation of raw materials, such as meat, poultry and seafood which goes rotten easily unless processed quickly at a low temperature [4]. In these circumstances, workers often have to perform their tasks in a refrigerated room for long duration. The fact that the same task is performed repeatedly at such low temperatures also increases the risk of strains, particularly of the elbow and wrist. These workers are liable to suffer from respiratory disorders, frostbite and rheumatic disorders [4].

Workers in the food industry often use sharp and dangerous hand tools to process various raw materials [4]. In the meat processing branch, particularly sharp and heavy butcher's knives are used to cut and trim meat, which can be greasy and unstable on the cutting board.

The floor surfaces of meat processing plants can also be dangerously slippery as a consequence of dropped animal fats. Some works in the food industry can be highly seasonal when the raw materials are of seasonal nature [4]. Because raw materials such as fruits and vegetables are highly perishable, they have to be processed within a short time period. As a result, workers can be exposed to consequent overexertion which can lead to high stress and MSDs.

Workers in certain branches run a high risk of inhaling a heavy concentration of dust particles, which are likely to result in respiratory disorders and allergies [4]. Processes such as grinding and mixing of grain, beans, nuts and herbs emit considerable levels of dusts into the air. Employees working in such environment for long are liable to inhale dust particles to such an extent that allergic symptoms begin to appear [4].



Fig.2. Dust generation leading to allergic respiratory problems in the susceptible individuals [16].

Workers can also be exposed to a high risk of injury from glass bottles, which can fall and break whilst being washed or burst whilst being filled [4]. Glass bottles are also a source of high noise levels which can be hazardous to workers' hearing. Glass bottles are now gradually being replaced by aluminum cans and plastic bottles, which are lighter and easier to handle and present no danger of injury to workers. However, the manufacturing of plastic bottles is a process which produces high noise levels and in which particularly hazardous chemical substances are used.

Ergonomic Interventions

As demonstrated above, food industry workers may experience fatigue and discomfort while performing highly repetitive tasks, working in recurring and sustained or awkward postures, performing heavy physical works and using forceful exertions. Prolonged working under such conditions may result in chronic injuries to muscles, tendons, ligaments, nerves and blood vessels. Injuries of this type are known as work-related musculoskeletal disorders (WMSDs) [7,8]. WMSDs can increase the cost that may include medical services, workers' compensation premiums, employee turnover, absenteeism and retraining [7]. Productivity, product quality and employee morale may also suffer [7]. One way to reduce WMSDs and the other OSH problems in the food industry and food-related workplace is to apply ergonomic interventions. Ergonomics is the study of how to improve the fit between the tasks of jobs and employees who perform the works [9,10].

Employees in the food industry also suffer frequent sprains and strains in various parts of their bodies [11]. For example, cumulative trauma disorders (CTDs), which are also referred to as repetitive strain disorders (RSDs), account for a large percentage of workers' compensation cost, particularly in the US meat-packing industry [10]. Overexertion from lifting, pulling and pushing heavy objects is the normal cause of these injuries. They can be reduced considerably by automation of strenuous tasks. If automation is not feasible, ergonomic interventions such as a safe posture for lifting, pulling and pushing heavy objects should be established with weight restrictions for such tasks.

In addition to the issue of overexertion in the handling of heavy objects, employees in the food industry are also often uncovered to perform tasks in awkward and stressful postures, which may result in

sprains and strains, particularly to the wrists and the elbows. Working in such uncomfortable positions leads to greater fatigue, which increases the risk of accidents. The tools and machineries, which employees use, may also be too heavy for the tasks performed.



Fig.3. Overexertion for a longer period of time leads to sprain and stress in the muscles [17].



Fig.4. Use of mechanical equipments to reduce the overexertion by manual work [18].

Therefore, ergonomic approaches have come to play an important role in the food industry and consist of optimum designing equipment's and work stations for the workers to carry out their tasks efficiently with as little fatigue and discomfort as possible. When ergonomically sound tool is planned, the workers' body structure (anthropometry) should be fully reflected.

A sufficient leg room is also needed to be able to adopt the most comfortable postures, both for workers who are standing and those who are sitting. In general, there is little room for doubt that better designed tools, equipment and workstations result in greater efficiency and a safer working environment for the food industry [4].

PREVENTIONS

Same level fall hazards, use of knives, collision, lifting and repetitive work

- Maintain walkways and working surfaces to be clean and dry by preventing spillages during operation and also providing workers with anti-slip footwear.
- Provide workers with gloves that will protect them from knife cuts.
- Reduce opportunities for collision when laying out process flow activities.
- Demarcate transport passages and working areas. Also ensure placement of handrails on platforms and stairs.
- Prevent spillage of water/liquids.
- Workers must be trained in proper lifting techniques and workstations should be designed to ensure that the worker has enough workspace.

Exposure to noise

- Some operations such as the canning, bottling, and the use of conveyors cause workers to be exposed to excessive noise levels. Engineering control measures should be used to reduce the noise levels, and personal protection should be emphasized.

Biological hazards

The following may control exposure to biological hazards in this industry:

- Install exhaust ventilation at the source to reduce dust.
- Provide workers with suitable personal protection equipments and ensure training on its proper use.
- Promote personal hygiene and ensure physical segregation of work and welfare facilities.

Chemical hazards

Workers should be trained on safe working procedures for each activity inclusive of first aid measures.

Heat and cold

A registered medical practitioner or registered nurse must certify workers as medically fit.

Confined spaces

The employer is responsible for determining if confined spaces are present in the workplace. If there are any, all access points must be secured against entry or signs to identify confined spaces.

- Work permit must be issued for work to be conducted in a confined space.
- Workers must be provided with proper breathing apparatus prior to entering confined space and they must be trained on how to use the apparatus.

Falling objects

- Ensure items stored above ground level (e.g. on storage shelving) are stable and will not fall easily if disturbed. Store heavier items on or near the ground and lighter items higher up.
- Give careful consideration to methods of stacking, handling and movement of goods to prevent articles falling.
- Make sure tall self-standing objects (e.g. gas cylinders) or objects leaning against walls are stable if knocked, and secured.

Hand tools

- Hand knives cause the greatest number of injuries and should be safely stored/sheathed when not in use.
- When hand knives are in regular use, knife resistant protective clothing should be worn as determined by the risk assessment (e.g. for butchering an apron and forearm guard/glove for the non-knife hand).
- Hand tools should be maintained in good condition so that undue force is not required to use them.

Moving objects

- Pedestrian operated pallet trucks, racks, trolleys etc. should use designated routes away from other workers wherever possible. The person pushing/pulling should have good visibility.
- Risk assessment should consider which other work area specific hazards may be present (e.g. rolling barrels or kegs, hoist hooks, items ejected from machines).

Occupational Diseases

The main causes of occupational ill health in the food and drink industries are:

- **Musculoskeletal disorders (MSDs):** mainly comprising work-related upper limb disorders (WRULDs) and back injuries.
- **Work-related stress:** which can be caused by poor work organisation.
- **Occupational asthma:** caused by inhalation of bakery and grain dusts.

- **Occupational dermatitis:** from handwashing, contact with foodstuffs, etc.
- **Rhinitis:** caused by irritant dusts such as bakery and grain dusts, spices and seasonings.
- **Noise-induced hearing loss:** where noise levels exceed.

Of the above risks, MSDs (both WRULDs and back injuries) are by far the most common [5].

PERSONAL PROTECTIVE EQUIPMENT'S IN FOOD & BEVERAGE INDUSTRY

Labour legislation in many countries provides that it is the duty of the employer to provide personal protective equipment to workers engaged in hazardous tasks. Under this legislation, workers who handle dangerous hand tools and machines, under extreme temperatures, handle hazardous substances or run the risk of inhaling such substances, or are exposed to radiation, have to be provided with appropriate protective equipment(s) and have the duty to utilize them properly. Personal protective equipment is clearly essential in protecting workers from risks at the workplace. However, such equipment should be regarded only as supplementary protection.

The main challenge facing any industry is to eliminate hazards at source. Personal protective equipment therefore becomes a supplementary, although very important, means of protecting workers.

Workers in the meat, marine products, vegetable and fruit processing branches are at particular risk due to the sharp hand tools which they use. Workers who process large carcasses face the risk of more serious wounds because they have to use sharper and heavier butchers' knives in order to cut greasy and sometimes unstable pieces of meat. Furthermore, due to the animal fat which fall on the floor, there is also a risk of falling while holding dangerous tools. The parts of the body most commonly cut, particularly in the meat and marine products processing branches, are the fingers, hands and torso. While it is essential for the workers to be thoroughly trained in the safe handling of dangerous tools, it is also necessary to prevent such injuries by protecting the parts of the body which are exposed to danger.



Fig.5. Use of the personal protective equipment to prevent from the hazards [19].

Workers in the drinks industry are also recommended to use tongs and brushes while handling pieces of broken glass, which are large enough to be seen, and vacuum cleaners when cleaning up smaller particles. Bare hands should not be used at any time [12]. Various processes used in the food and drink industries involve the use of heat, with a consequent risk of burns. Heat-proof mittens and rubber aprons are the best forms of protective clothing to prevent such injuries. However, it is also very important for the workers to be attentive enough to reduce their own risks. Some simple rules can be followed, such as, when lifting a pot cover, the worker should tilt it slightly away from the body in order to release the steam before opening it completely. Heated oven doors should never be left open and hot liquids should be poured away from body. Observance of simple rules of this type, when combined with the use of protective equipment, can be very effective in reducing the risk of burns. In the meat processing branches, it is strongly recommended that the use of slip-resistant safety boots be made mandatory. In other branches, workers who have to work on floors which are likely to become wet and slippery should also be provided with similar shoes. Safety boots are also effective in protecting workers who carry hot substances [4].

CONCLUSIONS

Food preparations, processing and dining services are potentially dangerous jobs which occasionally leads to serious injuries [13]. Because of this outcome, a high percentage of occupational injuries are reported in the food industry. Hence, work-related risks in the food industry require careful attention to OSH principles and a key to avoiding these accidents is to be aware of the things that can hurt employees.

This article briefly discussed OSH practices in the food industry from a view of ergonomic intervention. By understanding safety issues and recognizing associated OSH problems in the food industry, the following safety practices are suggested for the food industry:

- Machineries should be activated to heavy and repeating tasks to eliminate musculoskeletal hazards that risk the health of operators.
- Risks should be controlled at the root level to avoid infecting employees.
- Medical check-ups so as to determine workers' state of health should be regularly conducted.
- Employers and employees must be inducted on the OSH issues that apply to their workplace(s) and to the company as a whole.
- Accident statistics of a vacant workplace should be disclosed to a new worker so that employees become more careful when working and thereby reducing accidents.
- Upgrade the factory and workplace by installing new machines that are free from occupational hazards.
- Employers should provide adequate protective clothing only as the last line of protection.
- An accident register of all accidents and near misses should be kept at the workplace [14].

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EVENTS

NIOH-ENVIS Resource Partners participated in 25th National Children Science Congress, 27th- 31st December, 2017 held at Science city, Ahmedabad. Shri Vijay Rupani the honorable chief minister of Gujarat, inaugurated the event. During the exhibition, posters on the activities and achievements of ENVIS RP's were displayed. Information regarding Occupational health awareness and prevention was disseminated. Students from various schools, colleges, teachers and local public visited the stall.



Educational visit of students of IIPH, Gandhinagar and students of VS Hospital, Ahmedabad were held on 14th November, and 29th November, 2017. They were informed about the activities of NIOH and ENVIS NIOH. A presentation about ENVIS NIOH activities was given.



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