

REVIEW ARTICLE

Occupational Health And Safety In Drug Manufacturing Industry: A Short Review

Muhammad Maaz Arif¹

1. Department of Medical Education, University of Health Sciences, Lahore, Pakistan

Corresponding author: maazarifbutt@gmail.com

ABSTRACT

Background: Not much is known about the health risks of workplace in the drug manufacturing industry. While the pharmaceutical industries seem safe superficially, the production of medicines demand a well maintained and clean working atmosphere and the typical depiction of employees wearing white coats add to the illusion. **Objective:** To document occupational health and safety in drug manufacturing industry. **Methods:** Large-scale research was conducted to assess the health, safety and efficacy of specific drugs before their marketing and distribution, however only a few surveys have examined the occupational health and safety of employees who manufacture these drugs. **Results:** There are many irritants and drugs that cause risk to health, these include powdered penicillin, nicotinic compounds, Local anaesthetics, chloroform, sulfonechloramides, benzene, mepacrine, acriflavine and sulfonating agents. The most crucial aspects of efficient pharmaceutical safety management are knowing and recognising the danger of hazardous facility and hazard discharge. The easiest method to avoid difficulties is to eliminate the danger or employ substitution (choosing the least toxic or safest product or process available). Furthermore, it appears plausible to anticipate that chemical-related health impacts of pharmaceutical industry activity, long-term effects, in particular, are likely under-reported and understated. Other dangers (for example, ergonomic design and stressors) are reported more frequently in internal company systems, but are rarely acknowledged in public. **Conclusion:** General safety guidelines and rules for drug manufacturing safety should be followed. These include; not to work alone in the laboratory, never use pipette with mouth, wear goggles or safety glasses in the laboratory, practice personal hygiene rules, do not eat or drink in the laboratory, use PPE and the practice of good housekeeping techniques. **Keywords:** Occupational health and safety, drug manufacturing, Pharma industry, international standards

Word count 282

Funding: No

Conflict of interest: No

INTRODUCTION

There is not much information about the health dangers associated with the drug manufacturing industry's workplace. While the pharmaceutical industries seem safe superficially, the making of medicines demands a well-kept and clean working atmosphere and the typical depiction of employees wearing white coats add to the illusion.¹ Large-scale research is conducted

to assess the health, safety and efficacy of specific drugs before their marketing and distribution, however, only a few surveys have examined the occupational health and safety of employees who manufacture these drugs. While the health and safety of chemical workers who manufacture non-pharmaceutical chemicals has been studied extensively, different is the case with

pharmaceutical production employees. The morbidity and mortality experience of pharmaceutical employees has been previously discussed in a few researches.^{2,3} The drug industry manufactures therapeutic substances, both human and veterinary medications, pharmaceuticals, and associated items, in a growing concentrated network of large international firms and

Materials and Methods

Study design: Systematic review

Setting: Department of Medical Education, University of Health Sciences, Lahore, Pakistan

Duration: The study was done in 6 months

Inclusion criteria: Full length article published in English language meeting our search strategy were taken

Exclusion criteria: Copy right and articles required subscription and fee were excluded.

Search strategy: The articles were selected using Pubmed and Google Scholar databases any where from year 1990 onwards. The keywords used for searching were “pharmaceutical”, “industry”, “workers”, “health” and “safety”.

RESULTS:

Common epidemiological findings of drug industry employees have been carried out in the United States (excluding Canada) and Europe. The findings depicted an increase in the prevalence of chronic bronchitis and hypertension among Serbian plant workers.⁵ Furthermore, it was observed that among Polish sulfonamide workers, changes to mouth and teeth including leukoplakia (thick white patches) were reported.⁶ In a report that showed any worker who had a full-time job from 1970-1996 and with assessed exposure to 9 of the more than 50 chemicals in the plant, lung cancer that could have occupational links to non-Hodgkin's lymphoma and lymphatic-hematopoietic tissue cancer in a small group (majority male) employees of the same U.S plant.⁷

subcontracting facilities. The sector's activities are divided into five basic categories: administration, manufacturing, marketing and sales, distribution, and research & development (R & D). There are three essential processes in the production of drugs: R & D, manufacturing, and packaging.⁴

Another study reported in a Croatian plant displayed the danger of chronic and acute respiratory symptoms from various unnamed drugs.⁸

Chemical Hygiene Programme and a designated Chemical Hygiene Officer are required by the "Laboratory Standard," 29 CFR 1910.1450. The fundamental principles of safe laboratory work can be found in your local Chemical Hygiene Programme. The people responsible for the chemical hygiene program include the chief executive officer, chemical hygiene officer, laboratory supervisors and laboratory workers.⁹ It is vitally important to identify and control chemical hazards. Identifying chemical hazards include chemical labeling, the manufacturer, importer and precautionary statements.¹⁰ The control of chemical hazards includes elimination, substitution, isolation, engineering measures, administrative controls and personal protective equipment.¹¹

Major dangers are a concern for pharmaceutical facilities and others. Risk management firms' assistance in this area for pharmaceutical organizations is based on their experience working across the entire spectrum of these businesses. The method of managing major hazard risk is based on risk assessment in safety management, which comprises formal safety management systems and behavior-based safety programs. Risk evaluation of laboratory tasks biological containment laboratories is required for diagnostic and detection

activities, as well as research and development. In these laboratories, many different types of microorganisms are treated, and each activity done on the microorganism has the potential to represent a risk.¹² As a result, the risks must be assessed so that precautions can be taken to

protect both employees and the environment from infection. Risk assessments, according to the WHO's laboratory biosafety manual, are the foundation of any laboratory safety program.¹³ Some many irritants and drugs cause risks to health, these are shown in Table 1.^{14, 15}

TABLE 1: Drugs with their harmful aspects ^{14, 15}

DRUG	HARMFUL EFFECTS
Powdered penicillin	Skin sensitizer and skin irritant
Nicotinic compounds	Itching, Diffused erythema
Local anesthetics	Epigastric pain, GIT problems, Liver diseases, Fatigue
Chloroform	GIT problems, Liver poison
2-methyl-1, 4-naphthoquinone	Skin sensitization, Dermatitis
Sulfonechloramides	Local irritants and sensitizers
Benzene	Benzene poisoning
Mepacrine and acriflavine	Conjunctivitis
Sulfonating agents	Irritant, Bronchitis, Conjunctivitis.

CONCLUSION AND RECOMMENDATIONS:

The most crucial aspects of efficient pharmaceutical safety management are knowing and recognizing the danger of hazardous facilities and hazardous discharge. An effective hazard and risk assessment enables the development of an incident action plan as well as the implementation of strategies and tactics. A precautionary attitude to hazards, as in other work environments, is the basis of a safe and healthy pharmaceutical industry workplace, and responses to dangers should be guided by public health principles. The easiest method to avoid difficulties is to eliminate the danger or employ substitution (selecting the least toxic or safest product available). Furthermore, it appears plausible to anticipate that chemical-related health impacts of pharmaceutical industry activity, particularly chronic effects may be under-

reported or incorrectly estimated. Other dangers (for example, ergonomic design and stresses) are recorded more frequently in internal business processes but are rarely highlighted in the mainstream media. General safety guidelines and medication production safety rules must be observed. These include not working in the laboratory alone. Never use a pipette in your mouth. Always wear goggles or safety glasses in the laboratory. Follow personal hygiene guidelines (for example, wash your hands before exiting the laboratory). In the laboratory, no food or drink should be permitted. Wear PPE and avoid wearing laboratory coats outside of the laboratory - and close-toed, sturdy shoes. Use good housekeeping procedures, such as keeping paths free and labeling and dating all containers. Improving existing regulations'

ratification and implementation. Increasing the scope of risk assessments and controls. Multi-agency approaches to chemical management are being improved and raised awareness. It is critical to pay close attention

to the criteria for reproductive and genotoxic compounds, as well as mutagens and carcinogens. Ergonomic requirements must also be met.

REFERENCES:

1. Wigmore D. Pharmaceuticals Manufacturing: What do we know about the occupational health and safety hazards for women working in the industry?: Women and Health Protection; 2009.
2. Gathuru I, Buchanich J, Marsh G, Dolan D. Health Hazards in the Pharmaceutical Industry. *Pharmaceut Reg Affairs* 2015;4(3):1-15.
3. Teichman RF, Fallon LF, Jr., Brandt-Rauf PW. Health effects on workers in the pharmaceutical industry: a review. *J Soc Occup Med*. 1988;38(3):55-7.
4. Human Resources and Skills Development Canada (HRSDC). Pharmaceutical and medicine industry. 2007.
5. Milovanović A, Jakovljević B, Milovanović J, Paunović K, Ilić D, Torbica N, et al. [Morbidity patterns of workers employed in pharmaceutical-chemical industry]. *Srp Arh Celok Lek*. 2007;135(3-4):184-90.
6. Nowicka J, Zajackowska-Białowas L, Kuc B, Sibora P. [Clinical picture of dentition, periodontium and mouth mucosa in pharmaceutical industry workers]. *Med Pr*. 1988;39(2):130-6.
7. Marsh GM, Youk AO, Esmen NA, Buchanich JM. Mortality patterns among workers in a US pharmaceutical production plant. *Ann Epidemiol*. 2005;15(2):112-22.
8. Zuskin E, Mustajbegovic J, Schachter EN, Kern J, Deckovic-Vukres V, Pucarin-Cvetkovic J, et al. Respiratory findings in pharmaceutical workers. *Am J Ind Med*. 2004;46(5):472-9.
9. Burton DJ. Using the NIOSH Pocket Guide to Chemical Hazards. *Occup Health Saf*. 2001;70(4):20, 2.
10. Haagsma JA, Tariq L, Heederik DJ, Havelaar AH. Infectious disease risks associated with occupational exposure: a systematic review of the literature. *Occup Environ Med*. 2012;69(2):140-6.
11. Cunningham VL, editor Environment, Health & Safety Milestone Aligned Process (Ehs Map): A Gsk View Of Ehs In New Product Development. WEFTEC 2005; 2005: Water Environment Federation.
12. Tiner R. The pharmaceutical industry and disease mongering. The industry works to develop drugs, not diseases. *BMJ*. 2002;325(7357):1-8.
13. [Laboratory biosafety manual. World Health Organization]. *Ann Ist Super Sanita*. 1995;31(2 Suppl):1-121.
14. Hygienists ACoGI. [Threshold Limit Values and Biological Exposure Indices]; TLVs and BEIs: based on the Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices: ACGIH; 2002.
15. Allanou R, Hansen BG, Van der Bilt Y. Public availability of data on EU high production volume chemicals: European Commission European Chemicals Bureau; 1999.