



International Journal of Advanced Community Medicine

E-ISSN: 2616-3594

P-ISSN: 2616-3586

www.comedjournal.com

IJACM 2023; 6(3): 05-08

Received: 06-07-2023

Accepted: 10-08-2023

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Assessment of some occupational hazards in vegetable oils and soap manufacture in Gharbia Governorate, Egypt

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DOI: <https://doi.org/10.33545/comed.2023.v6.i3a.268>

Abstract

Background: Some processes during vegetable oils and soap manufacturing may produce various hazards.

Objectives: to assess some occupational hazards in one of companies in Gharbia Governorate, Egypt.

Subjects and methods: It was a cross sectional study at a Company for vegetable oils and soap manufacturing in Gharbia Governorate, Egypt. A checklist was used to assess physical, chemical, mechanical and other hazards in eight production departments.

Results: It was found that noise intensity and heat stress were measured in the workplace, but no actions were taken to reduce them. Also, no action was taken to provide appropriate lighting. No risk of radiation in the workplace. Posters and SDS for chemicals were present in half of the departments. But risk assessment for dealing with chemicals, danger and safe disposal of wastes was done in only two departments. Explosive materials were present in five departments.

Conclusion: Safety measures were somewhat sufficient in all production departments.

Recommendations: Engineering controls should be used to minimize occupational exposure. All workers should receive regular instructions on safe work practices.

Keywords: Occupational hazards, oils, soap, Egypt

Introduction

Early soap makers probably used ashes and animal fats containing potassium carbonate. During this process, a slow chemical splitting of the neutral fat occurred, and the fatty acids could then react with the alkali carbonates of the plant ash to form soap (saponification). Animal fats containing some free fatty acids were used by the Celts. The presence of free fatty acids certainly helped in starting the process [1]. This method was probably used until the end of the Middle Ages, when slaked lime was used to react with alkali carbonate. Soap production was helped by the introduction of the Leblanc process for the production of soda ash from brine and by the effort of a French chemist, Michel Eugène Chevreul, in 1823 who showed that saponification process is a chemical reaction of splitting fat into the alkali salt of fatty acids which is soap and glycerin. Producing soap by boiling with open steam was introduced at the end of the 19th century [2].

There are many occupational hazards in the production of vegetable oils and soap including physical hazards (as heat, high humidity and noise), chemical hazards (as chemicals, dust, vapors), mechanical hazards (due to heavy lifting, prolonged standing and wrong postures), electrical hazards and other types of hazards [3]. A hierarchy of controls should be used as a means of determining how to implement feasible and effective control solutions. The idea behind this basic hierarchy is that the control measures at the top are more effective and protective than those at the bottom. Following this hierarchy leads to the implementation of safer systems, where the risk of illness or injury has been substantially reduced to the minimum [4].

Industrial hygiene safety programs as workplace inspections, job safety analysis, enclosure of processes and use of personal protective equipment were successfully used to reduce exposure to such hazards [5]. Manufacture of vegetable oils and soap is economically important. However, information about occupational health hazards of these industries is insufficient in Egypt. Therefore, determination of occupational hazards in vegetable oils and soap manufacture could help in prevention and control of these hazards.

Subjects and Methods

Study design, settings and duration

A cross-sectional study that was carried out in all production departments in a Company in Gharbia Governorate, Egypt. The company includes eight production departments for vegetable oils and soap manufacture. Duration of study was from 2020 to end of 2021.

Data collection

Data was collected by the researcher through workplace inspection checklist including assessment of different occupational hazards and the eight production departments. Each question was answered by either "Yes" or "No".

Results

Regarding assessment of physical hazards in the work environment. It was found that noise intensity and heat stress were measured in the workplace, but no actions were taken to reduce them. Also, no action was taken to provide appropriate lighting. No risk of radiation in the workplace (Table 1). Regarding assessment of mechanical hazards, it was found that the moving parts of machines weren't surrounded by protective barriers, but the machines were provided with means of self-protection with periodic maintenance. Safety signs were found next to the machines (Table 2). Regarding the assessment of chemical hazards, it was found that safety precautions and emergency measures were applied to prevent the dangers of dealing with chemicals. Posters and SDS for chemicals were present in four departments. But risk assessment for dealing with chemicals, danger and safe disposal of wastes was done in only two departments. Explosive materials were present in five departments. The required actions were taken to reduce

the risk of explosive materials (Table 3). Regarding the the assessment of storage and warehouses. It was found that warehouses were secured and equipped with the appropriate fire and alarm with the application of safe storage procedures in most departments (75%). There wasn't any separation of flammable materials from oxidized materials. The stock was not covered with insulating, fire and liquid penetration resistant covers. Sub corridors were present in only two departments but there were signs of materials in the storage areas. (Table 4). Assessment of fire hazards in the workplace showed the presence of a civil protection report for the company regarding protection from fire hazards and necessary precautions were taken. There was a record for maintenance of fire extinguishers, there were fire extinguishers suitable for the type of fire and they were tested periodically. Enough workers have been trained in firefighting. (Table 5) Assessment of electrical hazards in the work environment showed that electrical connections and cables were insured. There were automatic electrical switches in case of electrical leakage or increased electrical loads, but there were no insulation floors in front of high voltage electricity distribution panels. (Table 6). Assessment of Occupational Safety and Health Management System showed that there was an occupational safety and health policy and an annual plan to implement this policy. Work environment risks were regularly assessed. Also, Work accidents were investigated and recorded. But Occupational safety and health officials did not perform daily inspection in every work shift on the work sites. Also, responsibilities weren't identified. Awareness and communication between management and workers were not sufficient to educate workers about the dangers of work and prevention (Table 7).

Table 1: Assessment of physical hazards

Safety measures	Yes		No	
	No.	%	No.	%
Noise intensity is measured in different workplaces	8	100	0	0.0
The required actions are taken to reduce the intensity of noise	0	0.0	8	100
Heat stress is measured in different workplaces	8	100	0	0.0
The required actions are taken to prevent hazards of heat stress	0	0.0	8	100
Safe lighting levels are provided in different workplaces	4	50	4	50
The required actions are taken to provide appropriate lighting in different workplaces	0	0.0	8	100
There are vibration hazards in the work environment	2	25	6	75
Assessment of vibration hazards is done, and the required actions are taken to prevent their risks	0	0.0	8	100
There is risk of exposure to ionizing, non-ionizing, laser and ultraviolet radiations	0	0.0	8	100
The required actions are taken for protection from the risks of ionizing, non-ionizing, laser, and ultraviolet radiations	0	0.0	8	100

Table 2: Assessment of mechanical hazards

Safety measures	Yes		No	
	No.	%	No.	%
Moving parts of machines and machinery are surrounded by permanent appropriate protective barriers	0	0.0	8	100
Necessary measures are taken to prevent the risk of clash with solid or moving objects in the work environment	0	0.0	8	100
Safety signs next to the machinery and equipment explain the individual safety instructions	8	100	0	0.0
The machines are provided with means of self-protection	8	100	0	0.0
Necessary periodic maintenance is done for machinery and equipment to ensure safety and security	8	100	0	0.0

Table 3: Assessment of chemical hazards

Safety measures	Yes		No	
	No.	%	No.	%
Necessary precaution and protective measures are taken to prevent the dangers of dealing with chemicals	8	100	0	0.0
Assessment of risks of dealing with chemicals, danger and safe disposal of wastes was done	2	25	6	75
Posters and SDS for all chemicals present, advertised, and translated in Arabic	4	50	4	50

Safety precautions and emergency measures are applied, and the staff are trained on them	2	25	6	75
There are explosive materials or substances that can form explosive mixtures	5	62.5	3	37.5
Required actions are taken to prevent risks of explosive materials (safe storage - ventilation – moistening)	8	100	0	0.0

SDS= Safety Data Sheet

Table 4: Assessment of storage and warehouses

Safety measures	Yes		No	
	No.	%	No.	%
The warehouses are secured and equipped with the appropriate fire and alarm	8	100	0	0.0
Safe storage procedures are applied	6	75	2	25
Flammable materials are separated from oxidized materials in storage	0	0.0	8	100
In open stores, the stock is covered with insulating, fire and liquid penetration resistant covers and the stock is about 15 cm high above the ground	0	0.0	8	100
Sub-corridors of at least 1.5 meters in the main stores are present	2	25	6	75
Signs are present in the storage areas of materials	8	100	0	0.0

Table 5: Assessment of fire hazards

Safety measures	Yes		No	
	No.	%	No.	%
There is a civil protection report stating that the factory has taken the necessary precautions for protection from fire hazards	8	100	0	0.0
Necessary precautions and requirements have been taken to protect the factory from fire risks	8	100	0	0.0
There is a record for maintenance of fire extinguishers	8	100	0	0.0
There are fire extinguishers suitable for the type of fire	8	100	0	0.0
There is a network or alarm tools, and practical trainings	8	100	0	0.0
Fire extinguishers are tested periodically	8	100	0	0.0
Enough workers have been trained in fire fighting	8	100	0	0.0

Table 6: Assessment of electrical hazards

Safety measures	Yes		No	
	No.	%	No.	%
Electrical insulation procedures are applied	8	100	0	0.0
Electrical connections are sound and insured	8	100	0	0.0
Electrical cables, boards and sources are intact and insured	8	100	0	0.0
Electrical machines are grounded	8	100	0	0.0
There are automatic electrical switches in case of electrical leakage or increased electrical loads	8	100	0	0.0
Periodic inspection of wires and electrical connections is done	8	100	0	0.0
There are insulation floors in front of high voltage electricity distribution panels	0	0.0	8	100

Table 7: Assessment of Occupational Safety & Health Management

Occupational Safety and Health Management	Yes		No	
	No.	%	No.	%
The facility has an occupational safety and health policy	8	100	0	0.0
There is an annual plan of the facility to implement occupational health and safety policy	8	100	0	0.0
Work environment risks are regularly assessed	8	100	0	0.0
The means of awareness and communication between management and workers are sufficient to educate workers about the dangers of work and prevention	2	25	6	75
Responsibilities of the occupational safety and health of managers, supervisors and technicians are identified	0	0.0	8	100
All work accidents are investigated and recorded	8	100	0	0.0
Occupational safety and health officials of the facility perform daily inspection and in every work shift on the work sites	0	0.0	8	100

Discussion

Although some industries have evolved high-tech approaches to minimize workers’ exposure to hazards, workers in the developing countries are still at high risk of occupational hazards. Several studies in developing countries like Egypt have assessed occupational hazards among workers ranging from professionals (white collar) to manual workers (blue collar) and showed increased prevalence of occupational hazards among blue-collar workers than their white-collar counterparts [6].

There are many occupational hazards in the manufacture of vegetable oils and soap as exposures to various chemicals (including acids, alkalis, solvents and fragrances) and

exposures to high levels of heat, humidity and noise. Also, accidents as mechanical injuries and explosions can occur frequently. These hazards may affect exposed workers and the nearby environment if safety measures are not properly applied [7].

Regarding applied safety measures at the company, they were somewhat sufficient but not fully implemented. In comparison to the current study, the study in a vegetable oil producing industry in Nigeria found that occupational health and safety in the workplace was inadequate with presence of different occupational hazards which suggested implementation of stringent safety measures [8]. A study in India who analyzed 11 soap and detergent factories for

occupational hazards and inspected 171 workers for safe work practices by using Job Safety Analysis method (JSA). Based on overall JSA results, 35.7% included in low-risk category, while 28.6% were of high-risk category^[9].

According to a previous case study made by Ibrahim WIM *et al.* (2018) to check safety measures in a detergents factory, Khartoum State – Sudan regarding different items including noise, lighting, temperature, fire, gas, electricity safety, machinery, manual handling and pressure systems safety revealed that the factory applied all the required safety measures with satisfaction of the standards of Ministry of Health. This was in agreement with the present study. While regarding environmental monitoring, that study reported high noise and temperature levels in some departments^[10].

Conclusions

Based on the results of our study, we can conclude that more than half of the oil and soap company production departments were somewhat sufficient regarding most items of the workplace checklist.

Recommendations

- Well-designed engineering controls should be used to minimize workplace exposures by using mechanical handling, enclosures around work processes and adequate ventilation.
- Improving the workplace safety measures and ensuring that workers follow safe work practices.

Author's Contribution

Not available

Conflict of Interest

Not available

Financial Support

Not available

References

1. Rasmussen CS, Konkol LK. An Ancient Cleanser: Soap Production and Use in Antiquity. ACS Symposium Series; c2015. p. 245-266.
2. Kent JA. Hand book of Industrial Chemistry and Biotechnology; c2012. p. 1431-1450.
3. Konkol KL, Rasmussen SC. An ancient cleanser: soap production and use in antiquity. In Chemical Technology in Antiquity, American Chemical Society; c2015. p. 245-266.
4. Vredenburg. Organizational safety: which management practices are most effective in reducing employee injury rates?. J Saf Res. 2002;33(2):259-276.
5. Kogi K. Work improvement and occupational safety and health management systems: Common features and research needs. Ind Health. 2002;40(2):121-133.
6. Omotosh M, James B, Adekunle S, Hauwa S, Ade OA. Occupational hazard awareness and safety practices among cement factory workers at obajana, Kogi state, Nigeria. Elixir Int Journal. 2012;47:9013-9018.
7. Achaw OW, Danso-Boateng E. Chemical and Process Industries. Soaps and Detergents: With Examples of Industries in Ghana; c2021. p. 1-37.
8. Ef B, Ta L, Mkc S. Occupational Hazard Assessment in a Vegetable Oil Producing Industry, Southwestern

Nigeria. 2020;10(1):259.

9. Sahu V. Safety Analysis in Soap and Detergent Industries. Int. J Res. Eng. Sci. Manag. 2019;2(6):2581-5792.
10. Ibrahim W. Safety and Environmental Risk Assessment of Detergents A Case Study: Sulfonia Detergents Factory, Khartoum State-Sudan. Industry Department of Chemical.

How to Cite This Article

Elghmry ZM, Zayed HA, Aldeib AF, Abouzeid MS, Kabbash IA. Assessment of some occupational hazards in vegetable oils and soap manufacture in Gharbia Governorate, Egypt. International Journal of Advanced Community Medicine. 2023;6(3):05-08.

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