

Occupational Health Hazards for Workers at the Plastic Factory in Benha City

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Abstract

Background: Occupational health hazards in the workplace include chemical, physical, biological, and psychological hazards. Plastic factory workers perform strenuous tasks and are exposed to a variety of health risks and hazards. **Aim of study** was to assess occupational health hazards for workers at Plastic Factory in Benha City. **Research Design:** Descriptive research design was utilized to conduct this study. **Setting:** The study was conducted at the Plastic Factory in Benha City. **Study subjects:** A convenience sample was used including 150 plastic factory workers. **Tools of data collection:** Two tools were used: **Tool (I):** A structured interviewing questionnaire to assess; **A-** Social demographic characteristics of the studied workers, **B-** Work characteristics of the studied workers, **C-** Health problems of the studied workers, **D-** Knowledge of the studied workers about occupational health hazards and **E-** Reported practices of the studied workers about prevention of occupational health hazards and **Tool (II):** Environmental checklist to assess work environmental condition of workers regarding prevention of occupational health hazards. **Results:** 61.3% of the studied workers' age ranged from 30 to less than 40 years old, 56.0% of the studied workers had intermediate education, 12.0 % of the studied workers had a good knowledge level about occupational health hazards and 61.3% of the studied workers had unsatisfactory reported practices about prevention of occupational health hazards. **Conclusion:** There was statistically significant correlation between the studied workers' total knowledge score and total reported practices score. **Recommendations:** Developing health educational program for workers at the plastic factory to improve and update their knowledge and practices regarding prevention of occupational health hazards.

Keywords: Occupational Health Hazards, Plastic Factory, Workers.

Introduction:

Occupational health aims to promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations. Occupational health also, covers the prevention amongst workers of departures from health caused by the working conditions and the protection of workers in the employment from risks resulting from factors adverse to health (Amponsah & Dartey, 2022).

Occupational health hazards are conditions that result from exposure in a work

place to a physical, chemical or biological agent to the extent that the normal physiological mechanisms are affected and the health of the worker is impaired. Exposures to occupational hazards in plastic factory are generally indicating poor safety standards, careless handling causing serious injuries and health problems (Rout & Sikdar, 2019).

The plastic industry manufactures polymer materials commonly called plastic and offers services in plastic important to arrange of industries, including packaging, building and construction, electronics,

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aerospace, manufacturing and transportation. It is a part of the chemical industry. Plastics today are mostly made from natural materials such as cellulose, coal, natural gas, salt and crude oil through polymerization or polycondensation process. Going forward, plastics will increasingly be made from waste, renewable materials or carbon dioxide (**Kim et al , 2020**).

Occupational hazards in the plastics industry include angiosarcoma which is one of several plastics that can affect people working in non-plastic industries, and the decomposition of polyester vinyl rubber, which is widely a chemical component of materials used in industry, and may also add to the impeccable health of workers. The fumes produced by the chemicals used in making plastics cause severe eye, nose and lung irritation, and some of these effects are long-term and often irreversible (**Zittling & Vanio, 2019**).

Environmental problems caused by plastic factories which include items made of plastic that are durable, which means that they break or slowly decompose to the original state when disposed of in the environment. Therefore, these items pose a huge threat to the cleanliness of the environment. Although plastic can be disposed of by burning it, this option doubles the problems. Environmental risks caused by plastic materials due to burning plastic such as Polychloride Vinyl, (PVC) which emits toxic fumes, and poses health risks to people (**Eckardt, 2019**).

According to the latest estimates released by the International Labour Organization (ILO), 2.78 million workers die every year due to occupational accidents and work-related disease. Some 2.4 million (86.3 percent) of these death are due to work-related disease, while over 380.000 (13.7 percent) result from occupational accidents. Each year, there are almost thousand times more non-fatal occupational injuries than fatal

occupational injuries. Non-fatal injuries are estimated to affect 374 million workers annually, and many of these injuries have serious consequences for workers earning capacity in the long term (**International Labour Organization, 2020**).

Workers in plastic factory have duties concerning provision and use of Personal Protective Equipment (PPE) at work. PPE are equipment that protects the workers against health or safety risks at work. It can include items such as safety helmets, gloves, eye protection, high visibility clothing, safety footwear and safety harnesses. It also includes Respiratory Protective Equipment (RPE) (**Davalos et al., 2019**).

Occupational Health Nurses (OHNs) play an important role in the plastic factory as to observe and assess workers health status with respect to job tasks and hazards. OHNs, using the specialized experience and education, are also responsible for disease management, environmental health, emergency planning, workers treatment, follow-up and referrals, emergency care for job-related injuries and illnesses and rehabilitation for return-to-work issues. OHNs counsel workers about work-related illness injuries and emotional and family problems. They refer workers to other community resources, handle and coordinate follow-up care. They encourage workers to take responsibility for their own health, such as smoking cessation, exercise-fitness, nutrition and weight control, stress management, control of chronic illness and effective use of medical services (**Ervin & Kulbok, 2019 & Spreitzer et al., 2020**).

Significance of study:

The plastic and animating materials industries represent one of the seven major industries in the Egyptian market with a large number of workers. Plastic industry is one of the most ancient industries. 66.6% of the plastic workers in Egypt are exposed to

chemical substance above 5% significantly showed changes in x-ray films. The plastic industry in Egypt shows that, 70% of the 40.000 workers in Egypt working in the plastic industry have lung and respiratory system diseases. Some of these diseases lead to pulmonary embolism, in addition to diseases that afflict the residents near the factories with asthma, allergies and difficulty breathing. The work in plastic factory requires the development of theoretical and scientific knowledge about the protective measures in medicine and safety (**Moganti, 2020**). So, this study was conducted to assess health hazards among plastic factory workers, knowledge, practices and health hazards.

Aim of the study:

The aim of study was to assess occupational health hazards for workers at plastic factory in Benha City.

Research questions:

1. What are common health hazards facing plastic factory workers?
2. What are plastic factory workers' knowledge regarding common occupational health hazards?
3. What are plastic factory workers' reported practices to prevention of common occupational health hazards?
4. Is there a relation between socio-demographic characteristics of plastic factory workers and their knowledge toward occupational health hazards?
5. Is there a relation between socio-demographic characteristics of plastic factory workers and their reported practices toward occupational health hazards?
6. Is there a correlation between plastic factory workers' knowledge and their reported practices?

Subjects and Method:

Research design:

Descriptive research design was utilized to conduct this study.

Setting:

This study was conducted at the Plastic Factory in Benha City, Qaliubiya Governate.

Study subjects:

A convenience sample was used in this study. The total sample size included 150 plastic factory workers.

Tools of data collection:

Two tools were used to collect the data:

Tool (I): A structured interviewing questionnaire: It was developed by researchers, based on literature review of the current and past available national and international references related literature about occupational health hazards. It was written in a simple clear Arabic language and it comprised of four parts:

First part:

A- Demographic characteristics of the workers. It included 7 items such as age, gender, educational level, marital status, family type, monthly income and place of residence.

B- Work characteristics: It included 3 items such as working hours per day, number of experience years and previous training courses.

Second part: Health problems of workers during last six months which included 9 questions divided into:

I - Current medical history: It included 2 questions such as suffering from current health problems and smoking.

II- Past medical history: It included 2 questions such as suffering from previous health problems and previous hospitalization due to any disease or injury related working in plastic factory.

III- Common health problems related to working in plastic factory which included 5 questions such as respiratory problems, eye problems, skin problems, ear problems, and musculoskeletal system problems.

Third part: Knowledge of workers about occupational health hazards. It included 12

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questions such as meaning of occupational health, aim of occupational health, meaning of occupational health hazards, causes, types, respiratory problems, eye problems, skin problems, ear problems, musculoskeletal system problems, methods of prevention, and methods of maintenance of health and life style.

Scoring system of knowledge:

The score of plastic workers' knowledge about occupational health hazards was calculated as follows: (2) score for complete correct answer, while (1) score for incomplete correct answer, and (0) score for don't know answer or incorrect. For each section of knowledge, the score of questions was summed up and the total divided by the number of questions. These scores were converted into percent score for the part. The total knowledge score = (24 points) was considered good if the score of the total knowledge was $\geq 75\%$ (≥ 18 points), while considered average if it equals 50% - 75% (12- <18 points), while considered poor if it is $<50\%$ (less than 12 points).

Fourth part: Workers' reported practices about prevention of occupational health hazards. It was adapted from **Diane et al., (2020)** including 6 items as; personal hygiene, personal practices protective equipment, nutrition, rest and exercise, smoking and follow-up.

Scoring system:

The scoring system for workers reported practices were calculated as (1) score for done and (0) score for not done. The score of the items was summed up and the total divided by the number of the items, giving a mean score. These scores were converted into a percent score. The total reported practices score was 28 points that was considered satisfactory if the score of total reported practices $\geq 60\%$ (16 point), while considered unsatisfactory if the score of total reported practices was $<60\%$ (< 16 points).

Tool II: Environmental checklist: It was adapted from **Ghallys, (2019)** to assess work environmental condition of workers regarding prevention of occupational health hazards. It included 17 items such as: workplace is clean and organized, floor is safe and free of protruding nails and holes, paths are clearly and free of obstacles, adequate lighting, corridors and bathroom, floors are dry and slip-resistant, presence of secure stair case barriers, presence of sufficient exits, presence of equipped and independent room for health services, presence of appropriate number of ambulances, presence of all first aid equipment, presence of appropriate number of fire extinguishers clearly and noticeably, presence of smoke and heat repellent device, presence of smoking room, presence of healthy drinking water, presence of adequate ventilation, presence of clean and suitable bathroom, and presence of room for wearing personal protective equipment

Scoring system:

The scoring system for working environment were calculated as (1) score for present and (0) score for not present. The score of each item summed-up and then converted into a percent score. The total environment score = 17 points. It considered sanitary environment if the score $\geq 60\% = \geq 10$ points, and while considered $<$ unsanitary environment if the score $< 60\% = < 10$ points.

Administrative design:

Official letter was obtained and delivered from Dean of the Faculty of Nursing Benha University to administrator of plastic factory in Benha City to obtain the approval for data collection. The objective and the nature of the study were explained and then it was possible to carry out the study. The aim of the study was discussed with the workers. The time of data collection was also determined based on their view to gain their approval and cooperation.

Content validity:

Content validity of the tools was done by five Experts of the Faculty Nursing Staff from Community Health Nursing Department, Faculty of Nursing/ Benha University who reviewed the tools for clarity, relevance, comprehensiveness, and applicability and the modifications were done based on their opinion.

Reliability of the tools:

Reliability of the tools was applied by the researchers for testing the internal consistency of the tool, by administration of the same tools to the same subjects under similar condition on one or more occasion. The reliability of the tools were done by Cronbach's Alpha Coefficient test which revealed that each of the two tools consisted of relatively homogenous items as indicated by the moderate to high reliability of each tool. The internal consistency of knowledge was 0.791 and practices were 0.843.

Ethical considerations:

The Scientific Research Ethical Committee in the Faculty of Nursing/ Benha University accepted this study. A formal consent was obtained through official letter that sent to the director of the factory explaining the aim of the study. During the interview, the workers were informed about the objective of the study. Written consent was obtained from each participant and was assured that confidentiality of the data was assured and maintained. Each participant had the right to withdrawal from the study at any time or to refuse to answer specific question without giving any reason.

Pilot study:

A pilot study was conducted on (10%) of the total sample (15 workers) to test the content, applicability of the tools using the interviewing questionnaires. Based on the results of the pilot study, the modifications of the tools included rephrasing and rearrangement of some questions. The pilot

study was carried out through two weeks before starting the study and no modification were done, so the pilot study sample included in the total sample.

Field Work:

Data were collected over a period of 6 months. The actual field work was carried out from the beginning of November 2022 up to the end of April 2023, and the researchers visited the Plastic Factory from 9 A.M. to 2 P.M., three days /week). At the beginning of the interview; the researchers explained the purpose and importance of the study to the studied workers and obtained their consent. Then, the researchers collected the data from each worker. The average time taken to complete each interview ranged from 20-30 minutes and average number of workers ranged between 2-3 workers/day. The researchers checked each filled questionnaire to ensure its completion.

Statistical analysis:

All collected data were organized, tabulated and analysis was done using Statistical Package for Social Science (SPSS), Version 20. Descriptive statistics were first applied (frequency, percentages, and mean \pm standard deviation) then other statistical tests such as chi square (X^2). **Statistical significance was considered as:**

- Not significant P-value > 0.05 .
- Significant P-value < 0.05 .
- Highly significant P-value < 0.001 .

Results:

Table (1): Shows that, 61.3% of the studied workers' age ranged from 30 to less than 40 years old, with Mean \pm SD =33.50 \pm 5.45, 77.3% of the studied workers were males. 56.0% of the studied workers had intermediate education, 70.0% of the studied workers were married and 60.0% of them had extended family. Regarding monthly income 74.0% of the studied workers had inadequate

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monthly income. Also, 74.7% of the studied workers lived in rural area.

Table (2): Shows that, 31.3% of the studied workers had suffered from respiratory distress, 50.0% of them had suffered from blurred vision, 38.0 & 38.7% of the studied workers had suffered from skin itching and ear infection respectively, and 57.3% of the studied workers had suffered from low backpain.

Figure (1): Illustrates that, 12.0 % of the studied workers had a good knowledge level about occupational health hazards, while 54.7% of them had average knowledge level about occupational health hazards and 33.3% of them had poor knowledge level about occupational health hazards.

Figure (2): Demonstrates that, 61.3% of the studied workers had unsatisfactory reported practices about prevention of occupational health hazards, and 38.7 of them had satisfactory reported practices about prevention of occupational health hazards.

Table (3): Shows that, there were no statistically significant relation between

studied workers' total knowledge level and their age, marital status, family type and monthly income $p>0.05$. While, there was a statistically significant relation between total knowledge level and their gender. Also, there was a highly statistically significant relation between total knowledge level and their educational level $p<0.001$.

Table (4): Shows that, there was a statistically significant relation between the studied workers' total reported practices level and their educational level, marital status, family type and monthly income ($p<0.05$), while there were highly statistically significant relation between the studied workers total reported practices level and their age. However, there was no statistically significant relation between total reported practices level and their gender and place of residence ($p>0.05$).

Table (5): Explains that, there is highly statistically significant correlation between the studied workers' total knowledge level and the total reported practices level ($p<0.001^{**}$).

Table (1): Frequency distribution of the studied workers regarding their demographic characteristics (n=150).

Demographic characteristics	No.	%
Age/years		
20<30	39	26.0
30<40	92	61.3
40<50	19	12.7
Min -Max	24-45	
Mean \pmSD 33.50\pm5.45		
Gender		
Male	116	77.3
Female	34	22.7
Educational level		
Can't read or write	3	2.0
Basic education	51	34.0
Intermediate education	84	56.0
University education	12	8.0
Marital status		
Single	11	7.3
Married	105	70.0
Divorced	34	22.7
Family type		
Nuclear family	60	40.0
Extended family	90	60.0
Monthly income		
Enough	39	26.0
Insufficient	111	74.0
Place of residence		
Urban	38	25.3
Rural	112	74.7

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Table (2): Frequency distribution of the studied workers regarding their health hazards (n=150).

Health hazards	No.	%
*Respiratory problems		
Allergic rhinitis and sinuses	37	24.7
Chronic cough	20	13.3
Difficulty in breathing	29	19.3
Chronic sputum	42	28.0
Respiratory distress	47	31.3
Tonsilitis	33	22.0
Pneumonia	18	12.0
*Eye problems		
Irritation of the eye membranes	50	33.3
Entering a foreign body in the eye	4	2.7
Allergy and inflammation of the eye	27	18.0
Blurred vision	75	50.0
*Skin problems		
Skin inflammation	17	11.3
Skin dryness	6	4.0
Skin irritation	27	18.0
Burn	41	27.3
Skin itching	57	38.0
Change in the skin color	9	6.0
Wounds and bleeding	5	3.3
*Ear problems		
Ear infections	58	38.7
Ear pain	46	30.7
Ear discharge	48	32.0
*Muscular problems		
Fracture	17	11.3
Low backpain	86	57.3
Sprains and bruises	57	38.0

*** Results not mutually exclusive**

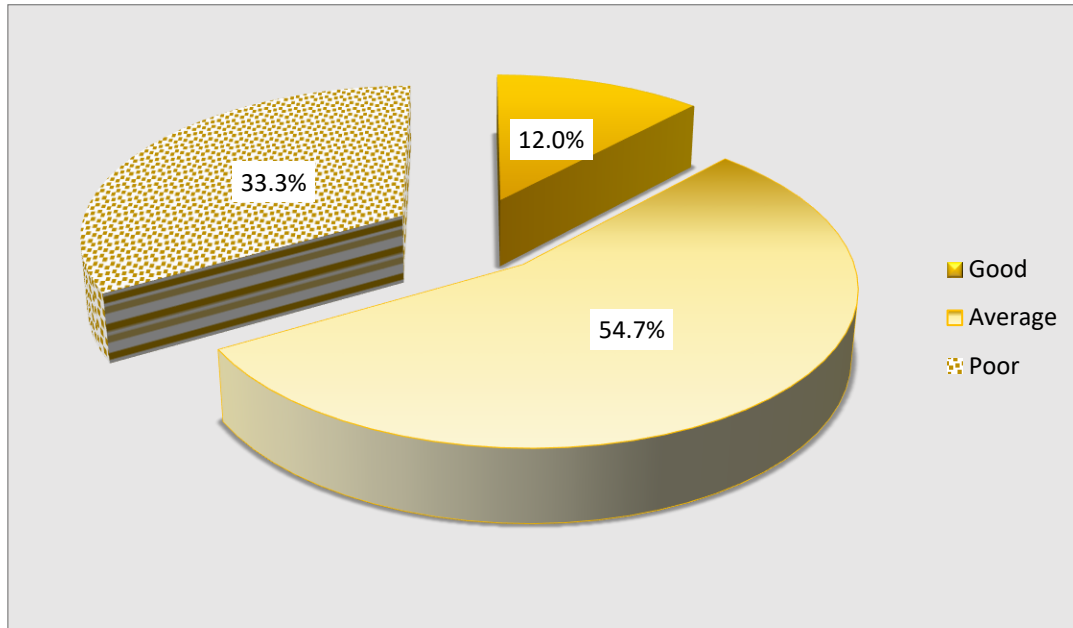


Figure (1): Percentage distribution of the studied workers' total knowledge level regarding occupational health hazards (n=150).

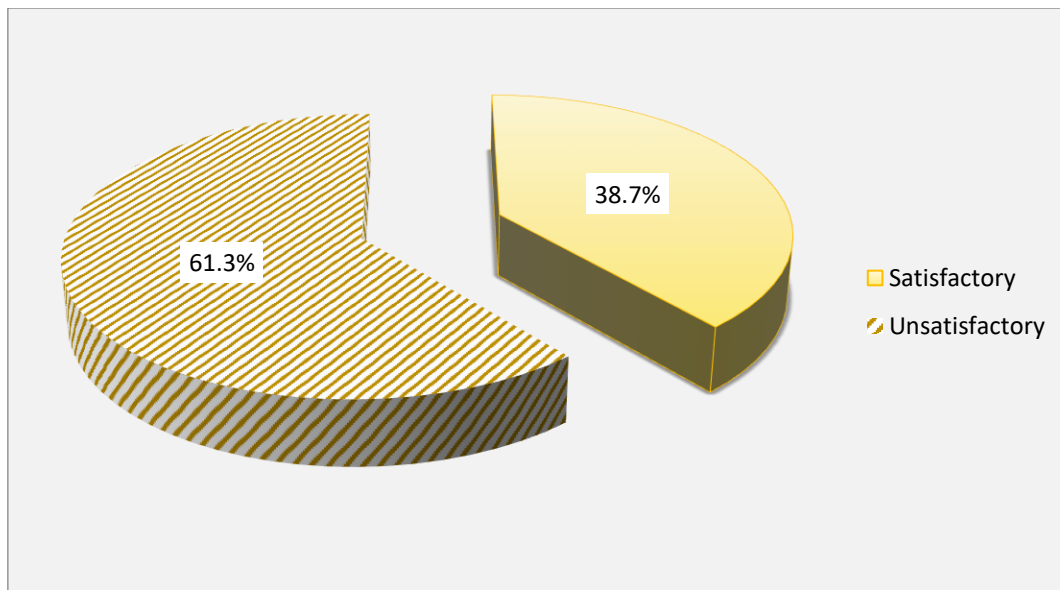


Figure (2): Percentage distribution of the studied workers regarding total reported practices level about prevention of occupational health hazards (n=150).

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Table (3): Relation between demographic characteristics of the studied workers and their total knowledge level (n=150)

Demographic characteristics	Total knowledge level						X ²	P-value
	Poor (n=50)		Average (n=82)		Good (n=18)			
	No.	%	No.	%	No.	%		
Age/Years								
20<30	8	16.0	27	32.9	4	22.2	5.006	0.287
30<40	34	68.0	46	56.1	12	66.7		
40<50	8	16.0	9	11.0	2	11.1		
Gender								
Male	34	68.0	65	79.3	17	94.4	6.452	.040*
Female	16	32.0	17	20.7	1	5.6		
Educational level								
Can't read or write	1	2.0	1	1.2	1	5.6	69.02	.000**
Basic education	23	46.0	25	30.5	3	16.7		
Intermediate education	25	50.0	55	67.1	4	22.2		
University education	1	2.0	1	1.2	10	55.6		
Marital status								
Single	4	8.0	7	8.5	0	0.0	4.733	0.316
Married	31	62.0	61	74.4	13	72.2		
Divorced	15	30.0	14	17.1	5	27.8		
Family type								
Nuclear family	10	20.0	23	28.0	6	33.3	1.618	0.445
Extended family	40	80.0	59	72.0	12	66.7		
Monthly income								
Adequate	14	28.0	16	19.5	8	44.4	5.132	0.077
Inadequate	36	72.0	66	80.5	10	55.6		

*Statistically significant relation $p < 0.05$

**Highly statistically significant relation $p < 0.001$.

Table (4): Relation between demographic characteristics of the studied workers and total reported practices level (n=150)

Demographic characteristics	Total reported practices level				X ²	P-value
	Unsatisfactory (n=92)		Satisfactory (n=58)			
Age/years						
20<30	13	14.1	26	44.8	19.127	.000**
30<40	68	73.9	24	41.4		
40<50	11	12.0	8	13.8		
Gender						
Male	67	72.8	49	84.5	2.758	0.097
Female	25	27.2	9	15.5		
Educational level						
Can't read or write	3	3.3	0	0.0	10.61	.014*
Basic education	38	41.3	13	22.4		
Intermediate education	47	51.1	37	63.8		
University education	4	4.3	8	13.8		
Marital status						
Single	5	5.4	6	10.3	6.633	.036*
Married	60	65.2	45	77.6		
Divorced	27	29.3	7	12.1		
Family type						
Nuclear family	45	48.9	15	25.9	7.876	.005*
Extended family	47	51.1	43	74.1		
Monthly income						
Adequate	17	18.5	22	37.9	6.997	.008*
Inadequate	75	81.5	36	62.1		
Place residence						
Urban	25	27.2	13	22.4	0.426	0.514
Rural	67	72.8	45	77.6		

*Statistically significant relation $p < 0.05$

** Highly statistically significant relation $p < 0.001$.

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Table (5): Correlation between the studied workers' total reported practices score and total knowledge level (n=150).

Items	Total reported practices score				X ²	P-value
	Unsatisfactory (n=92)		Satisfactory (n=58)			
Total knowledge						
Poor	45	48.9	5	8.6	34.5	.000**
Average	44	47.8	38	65.5		
Good	3	3.3	15	25.9		

Discussion

Occupational health hazards refer to workplace activities that have the potential to cause and increase the risk of injury or illness. It is also experienced in the workplace and in many jobs in which workers are exposed to a combination of potential hazards, and workers in every occupation can face multitude hazards in the workplace (Selvi, 2020).

Regarding demographic characteristics of the studied workers, the present study showed that three fifth of studied workers' age ranged from 30 to less than 40 years. This finding disagrees with **Khaliq et al., (2019)**, who performed a study about "Pulmonary function and oxidative stress in workers exposed to styrene in plastic factory: occupational hazards in styrene-exposed plastic factory workers in Egypt", and reported that the studied sample were age ranged from 18 and 40 years.

The present study revealed that, slightly less than one third of the studied workers had suffered from respiratory distress. This finding is supported by **Abdel-Rasoul et al., (2019)**, who performed a study about "Respiratory and auditory health disorders among workers in a plastic factory in Queisna City, Menoufia Governorate (n=180)", and reported that 30% of the studied workers styrene exposure leads to chronic bronchitis and obstructive pulmonary changes.

Regarding total knowledge level of the studied workers, the present study findings illustrated that, less than one fifth of the

studied workers had a good knowledge level about occupational health hazards. This finding disagrees with **Abd El Rahman, (2022)**, who conducted a study about "Occupational health hazards among workers in Glass Manufacture Industries, in Benha City", n=150 and illustrated that less than half of the studied workers had a good knowledge level about occupational health hazards.

Regarding total reported practice level of the studied workers about prevention of occupational health hazards, the current study findings showed that, three fifth of the studied workers had unsatisfactory reported practices about prevention of occupational health hazards. This might be due to lack of training courses and educational programs regarding prevention of occupational hazards.

The present study findings revealed that, there was no statistically significant relation between the studied workers total knowledge level and their age. This finding disagrees with **Ahmad et al., (2019)**, who studied "Knowledge of workers about risk factors, in Duhok City", n=501 and reported that, there were statistically significant relation between workers' total knowledge level and their age.

Regarding relation between demographic characteristic of the studied workers and total reported practices level, the present study findings revealed that, there was statistically significant relation between the studied workers' total reported practices level and their educational level, marital status,

family type, and monthly income. This might be due to working experience had a vital role in enhancing workers regarding prevention of occupational health hazards.

Regarding correlation between total reported practices score and total knowledge score, the present study findings showed that, there was a highly statistically significant relation between the studied workers' total knowledge level and the total reported practices level. This finding is compatible with **Abd El Rahman, (2022)**, who reported that there was statistically significant positive correlation between the workers' total knowledge and the total practices score.

Conclusion:

The study showed that more than half of the studied workers had average knowledge level about occupational and one third of them had poor knowledge level about occupational health hazards, more than three fifth of the studied workers had unsatisfactory reported practices about prevention of occupational health hazards and more than one third of them satisfactory reported practices about prevention of occupational health hazards.

There was highly statistically significant relation between total knowledge level of the studied workers and their educational level. Also, there was highly statistically significant relation between the studied workers' total reported practices level and their age. Moreover, there was highly statistically significant correlation between the studied workers' total knowledge score and their total reported practices score.

Recommendations:

- Developing health educational program for workers at the plastic factory to improve and update their knowledge and practices regarding prevention of occupational health hazards.
- Further research studies about prevention of occupational health hazards are needed to be carried out with different large

samples in different plastic factory settings.

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مخاطر الصحة المهنية للعاملين في مصنع البلاستيك بمدينة بنها

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يتعرض العاملون لكثير من مخاطر الصحة المهنية مثل المخاطر الكيميائية والفيزيائية والبيولوجية والنفسية ويتعرض العاملون بمصنع البلاستيك لمخاطر صحية مثل السرطان والحوادث وأمراض العظام وأمراض العضلات وأمراض الجهاز التنفسي وغيرها. لذا هدفت هذه الدراسة إلى تقييم مخاطر الصحة المهنية للعاملين في مصنع البلاستيك بمدينة بنها. وتم استخدام تصميم وصفي لتحقيق هدف الدراسة. حيث أجريت الدراسة في مصنع البلاستيك بمدينة بنها على عينة متاحة مكونة من 150 عامل في مصنع البلاستيك. وتم استخدام أداتين لجمع البيانات، إستمارة استبيان تحتوي على أربعة أجزاء: 1- الخصائص الديموغرافية للعمال وخصائص العمل، 2- التاريخ الطبي الحالي، التاريخ المرضي السابق و المشاكل الصحية الناتجة عن العمل، 3- معلومات عمال مصنع البلاستيك عن مخاطر الصحة المهنية و 4- ممارسات عمال مصنع البلاستيك عن الوقاية من مخاطر الصحة المهنية و الأداة الثانية: ملاحظة بيئة العمل في مصنع البلاستيك للوقاية من مخاطر الصحة المهنية. وظهرت النتائج ان 61.3% من العمال المدروسين تراوحت أعمارهم بين 30 إلى أقل من 40 سنة، 56.0% منهم لديهم تعليم متوسط، 12.0% من العمال المدروسين لديهم مستوى معلومات جيد حول مخاطر الصحة المهنية و 61.3% من العمال المدروسين كان لديهم ممارسات مبلغ عنها غير مرضية حول الوقاية من مخاطر الصحة المهنية. كما كان هناك ارتباط ذات دلالة إحصائية بين مجموع درجات المعلومات للعاملين في الدراسة ومجموع درجات الممارسات المبلغ عنها. واوصت الدراسة بتطوير برنامج تثقيفي صحي للعاملين في مصنع البلاستيك لتحسين وتحديث معارفهم وممارساتهم فيما يتعلق بالوقاية من مخاطر الصحة المهنية.