



## Effect of Occupational Health Program on Prevention of Occupational Health Hazards among Workers at Leather Tanning Factory

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### ABSTRACT

**Back ground:** Leather production includes many operations with different exposures, which can be harmful for the health of the workers. **Aim:** The study aimed to evaluate the effect of occupational health program on prevention of occupational health hazards among workers at Leather Tanning Factory. **Methods:** Quasi-experimental (pre/post-test) design was utilized in this study. The study was conducted at Leather Tanning Factory, Industrial Zone, Quesna City; Menoufia Governorate, Egypt with a systematic random sample was used. The total sample of the study was included 200 workers. **Tools:** I): A structured interviewing questionnaire which consisted of three parts to assess workers' socio-demographic characteristics, health problems which the workers suffer from at last six months and workers` knowledge about occupational health hazards II): Observational checklist to assess the environmental work setting and workers practices regarding prevention of occupational health hazards. **Results:** 37% of the studied workers aged between 30-<40 years with mean age was  $40.6 \pm 9.22$ , 32% of them had past experience from 6-10 years in this Factory and 81% of them had health respiratory problems in the last six months. 32% of the studied workers had good total knowledge scores regarding occupational health hazards pre-program and then this percentage increased to 68% post program, and only 11.5% of them had satisfactory total practices scores regarding prevention of occupational health hazards pre-program compared with 64% post program. **Conclusion:** The occupational health program succeeded to enhance knowledge and improve practices of the studied workers regarding occupational health hazards at Leather Tanning Factory. The study recommended that applying occupational health program for leather tanning workers regularly to increase their knowledge and their practices to prevent occupational health hazards.

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**Keywords:** Leather Tanning Factory, occupational health hazards, workers.



## Introduction

Leather production is one of the world's oldest trades, consisting of a chemical process that turns animal hides into the much less perishable material, leather. As part of this process, after the removal of the epidermis and subcutaneous tissue, the dermal collagen fibers are stabilized by means of chemical treatment known generically as tanning. Tanning leather is the process of treating skins and hides of animals to produce leather, which is more durable and less susceptible to decomposition. Employees who work in tanneries are liable to be affected by the exposure to lots of hazardous materials and processes during tanning. These hazards can be grouped into four categories: Biological, physical, chemical hazards and work accidents (**Halim et al., ; Gaafar et al., 2017**)

Occupational Health Hazards (OHHs) are a hazard experienced in the workplace that encompass many types of hazards, including chemical hazards, biological hazards (biohazards), psychosocial hazards and physical hazards. The Occupational Safety and Health Administration (OSHA) establish enforceable standards to prevent

workplace injuries and illnesses. It is a term signifies both long-term and short-term risks associated with the workplace environment, short term risks may include physical injury, while long-term risks may be increased risk of developing cancer or heart disease (**International Labor Organization (ILO), 2016**).

The International Labour Organization (ILO) estimates that 2.3 million women and men around the world succumb to work-related accidents or diseases every year; this corresponds to over 6000 deaths every single day. Worldwide, there are around 340 million occupational accidents and 160 million victims of work-related illnesses annually (**World Statistic, 2019**).

Leather is exclusively vast, multi-dimensional and mutually dependent material all over the world. Currently more than 5000,000 people are working in this sector and the number of workers is increasing from day to day all over the world. Work related accidents and diseases continue to have series consequence, with an estimated 2.3 million fatalities per year and economic losses of 4% of global gross domestic product. Employment in tannery industries has been



associated with various diseases caused by biological, toxicological, and carcinogenic agents (Seyoum, 2014).

Occupational Health Nurses (OHNs) play an important role regarding decrease risk of OHH among workers through protecting and promoting the health of them at work. They have direct contact with workers and are often approached with health-related questions and problems. The OHNs role include: Understanding the workers the effects of work on health and of health on work, providing advice on first aid management, workforce and workplace monitoring and health needs assessments, providing health screening services and educating workers about short term and long term effects of occupational hazards (Centers for Disease Control and Prevention (CDCP), 2017).

#### **Significance of the study:**

Occupational health hazards in industries occur in Egypt as a large proportion. It estimated about 64.9% of injured workers as job strain (Abou El- Wafa, 2017). About 83.5% of all injuries were industrial injuries and 13.3% occur at the work place from the total number of work place injuries reported in 2015,

nearly 88.4% of these occurred among male workers (Central Agency for Public Mobilization and Statistics (CAPMS), 2016). The tanning industry forms the backbone of the Egyptian leather industry. Approximately 300 tanneries are located in the “Old Cairo District” in Cairo City Center. The total labor force in the tanning sector is estimated at 15,000 workers, so there are health effects among workers in leather tanning, Egypt (Abou El-Khair, 2010).

#### **Aim of the study**

The study aimed to evaluate the effect of occupational health program on prevention of occupational health hazards among workers at Leather Tanning Factory.

#### **Research hypothesis**

Knowledge and practices of workers regarding occupational health hazards at Leather Tanning Factory will be improved after implementation of the occupational health program.

#### **Subject and Methods**

##### **Research design:-**

Quasi- experimental research design (pre/post-test) was used to conduct this study. Quasi-experimental research involves



manipulating an independent variable without the random assignment of participants to conditions or orders of conditions and can be constructed with single or multiple groups and may involve pretest and post-test or post-test only measurement (**Mateo & Foreman, 2014**). The quasi-experimental design includes a wide range of non-randomized or partially randomized pre-post intervention studies (**Handley et al., 2018**).

### **Research setting:-**

The study was conducted at Leather Tanning Factory at Industrial zone, Quesna City, Menoufia Governorate, Egypt.

### **Subjects:**

Systematic random sample was selected as 25% of total workers of one-fourth of all workers 800, so the total number of sample was 200 workers.

### **Tools of data collection:-**

**Tool (I): A structured interviewing questionnaire:** The researchers designed it after reviewing relevant literature. It consisted of three parts:

**Part 1** was to assess socio-demographic characteristics of the

workers. It included questions about age, residence, marital status, educational level, years of experience, monthly income, previous training courses, working hours/day and smoking.

**Part 2** was concerned with health problems which the workers suffer from during the last six months such as gastro intestinal tract problems, respiratory problems, eyes, ear, skin and musculoskeletal problems.

**Part 3** was concerned with workers' knowledge about occupational health hazards of Leather Tanning Factory and consisted of five questions (meaning, types, causes, health problems which result from occupational health hazards and prevention of occupational health hazards at Leather Tanning Factory, this tool measured pre and post program.

**Scoring system** for knowledge items was adapted as follows:

The correct and complete answer was scored (2), the correct and incomplete answer was scored (1) and the don't know was scored (0). For each area of knowledge, the score of the items was summed-up and the total scores were converted into a percent score. The total knowledge scores were considered



good if the score of the total knowledge  $>75\%$  ( $>7$  points) considered average if it equals 50-75% (5-7 points) and considered poor if it less than 50% ( $<5$  points).

**Tool II- Observational checklist:** Was concerned with two parts:

**Part 1** was concerned with environmental work setting and adapted from **Buljan et al., (1999)**: It consisted of 21 items (Existence of ventilation systems in areas with machines. Floors work surfaces and stairs are not slippery. Passages are free from obstacles and bad threats. Passages are clearly marked by the safe movement of people and materials. Solid waste is removed from the work area easily. Empty barrels storage removed from the work area. The floor is clean and free from chemical leakage. Drains provided with covers and free of clogging. All lights are working and suitable for working environment. The toilets are clean and in good condition. Drinking water is pure and available to workers. Chemical containers covered. Flammable materials are far from sources of ignition. Chemical containers are safe and tidy for leakage. There are at least two emergency exit points in the work area. Rescue equipment and emergency medical assistance are

available and their location is noticeable. Safety devices (covers, swords and belts) are in place. Enough space is available around the machine to allow maintenance. Safety signs are installed and in good order. The "smoking prevention" rule is followed by all workers. Warning alarm system tested and operated.

**Scoring system for the environment:** The scoring system was calculated as (2) scores for present, (1) for not present.

**Part 2** was concerned with:-**I-** Observing practices done by workers regarding prevention of physical hazards, biological hazards, chemical hazards, an ergonomic hazards and psychological hazards) which adapted from **Buljan et al., (1999)**: It divided into 5 items: Practices regarding prevention of physical hazards which consisted of five items, practices regarding prevention of biological hazards which consisted of four items, practices regarding prevention of an ergonomic hazards which consisted of six items, practices regarding prevention of chemical hazards which consisted of 12 items and practices regarding prevention of psychological hazards which consisted of 4 items.



**Scoring system:** Each item has 2 levels of answers: Done, and not done. These were respectively scored 1, 0. The scores of the items were summed- up and the total divided by the number of the items, giving a level score. These scores were converted into a percent score. The total of practices was considered satisfactory if the score  $\geq 60\%$  ( $\geq 19$  points) and considered unsatisfactory if it less than 60% ( $< 19$  points).

**II:** Observing workers when wearing personal protective equipment which included eight questions: Wear uniform, head cover, eye glasses, gloves, ear protection, breathing mask, apron and safety shoes.

**Scoring system:** Each item has 3 levels of answers: Available and using, available and not using and not available. These were respectively scored 2, 1, and 0. The scores of the items were summed- up and the total divided by the number of the items, giving a level score. These scores were converted into a percent score. The total of workers` practices was considered satisfactory if the score  $\geq 60\%$  ( $\geq 5$  points) and considered unsatisfactory if it less than 60% ( $< 5$  points).

### **Reliability and content validity of the tools:**

The reliability was done by Cronbach alpha coefficient test which revealed that each of two tools consisted of relatively homogeneous items as indicated by the moderate to high reliability of each tool. Internal consistency for knowledge was 0.83, and for practices 0.832. All tools were reviewed by 5 expertise in Community Health Nursing to test the content of validity. According to expert suggestions and comments modification was considered.

### **Ethical consideration:**

Permission has been obtained orally from each worker before conducting the interview and given a brief orientation to the purpose of the study. They were also reassured that all information gathered would be confidential and used only for the purpose of the study. No names were required on the forms to ensure anonymity and confidentiality. They were also informed about their right to withdraw at any time from the study without giving any reasons.

### **Pilot study:**

A pilot study was conducted on 10% of the studied sample (20 workers) to test the content,



applicability, clarity, and simplicity of the tool using the questionnaire and the observational checklist as a pre-test sheet. Those who shared in the pilot study were excluded from the studied sample based on the pilot results, the tools were modified. Modification of the tool included rephrasing and rearrangement of some questions. After refinement and modification, the final forms of the tool were developed. This pilot study was carried out in two weeks before starting the study.

#### **Administrative approval:**

Official permission took from the Faculty of Nursing / Benha University to the director of Leather Tanning Factory. The title, objectives, study technique and tools were illustrated for cooperation, as well as to allow the researchers to prepare regular arrangement for the workers.

**Field work:** The current study was implemented in four phases, assessment and planning, implementation and evaluation.

**Assessment and planning phase:** After obtaining official permissions to conduct the study, the researchers interviewed the workers, then, explained the study's purpose and asked for participation. Then, workers were interviewed to assess their socio-

demographic characteristics, knowledge and practices towards occupational health hazards. The information obtained during this phase constituted the baseline for the development of the program and was used for further comparisons to estimate the effect of occupational health program implementation.

**Implementation phase:** The program was implemented for 6 months from the beginning of December 2017 to the end of May 2018. Implementation of the program was carried out at Leather Tanning Factory 3 days / week (Saturday, Tuesday and Thursday) from 9:00 am to 1:00 pm. The subject material has been used in sequence through six sessions (two theoretical sessions and four practical sessions). The duration of each session was 30-45 minutes, including periods of discussion.

The workers were divided into small groups; each group included about 8 workers. The sessions were implemented for each group for 2 weeks (3 days /week), in addition to one week for posttest. The researchers worked with four groups in the same day.

At the beginning of the first session, the researchers welcome



and introduce themselves to the workers, an orientation to the program and its purpose were made and then explained the general information about meaning, types and causes of occupational health hazards taking into consideration the use of simple language to suite the level of the workers. In subsequent sessions, the researchers demonstrated health problems which result from occupational health hazards at Leather Tanning Factory, prevention from occupational health hazards and practices of workers to prevent occupational health hazards. After each session, a feedback about the previous session was done as well as the objectives of the new topics were mentioned.

All workers received the same program content using the same teaching methods, there were: Lectures/ discussions, power point presentation and using suitable teaching aids were specially prepared for the program, as follows: Booklets, pictures and real materials.

### **Evaluation phase:**

After implementation the program, the researchers applied the post-test immediately to evaluate the program. Evaluation of the program was done by using the post-test questionnaires which was the same formats of pre - test to compare the changes in the workers' knowledge and practices immediately after implementation of the program.

### **Statistical analysis:**

Statistical presentation and analysis of the present study data were carried out, using mean and standard deviation, Chi- square and linear correlation coefficient by using the Statistical Package for the Social Sciences (SPSS) version 20

Significance levels were considered as follows:

- P- Value  $> 0.05$ . Not significance
- P- Value  $< 0.05$ . Significance
- P- Value  $< 0.001$ . Highly significant





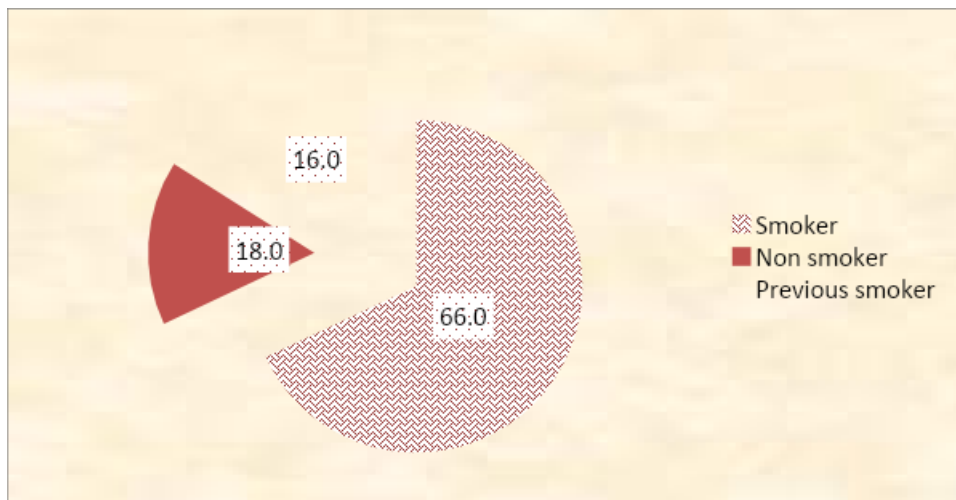
## Results

**Table (1):** Percentage distribution of the studied workers according to their socio-demographic characteristics (n=200).

Socio-demographic characteristics	%
<b>Age / years</b>	
20-< 30	23.5
30- < 40	37.0
40 - <50	29.5
50 -<60	10.0
<b>Mean± SD</b>	40.6±9.22
<b>Residence</b>	
Rural	75.0
Urban	25.0
<b>Marital status</b>	
Single	21.5
Married	65.5
Widow	10.0
Divorced	3.0
<b>Educational level</b>	
Don't read and write	11.0
Read and write	10.0
Basic education	19.0
Secondary education	60.0
<b>Years of experience</b>	
<5 years	15.5
5-<10 years	32.0
10-<15 years	16.0
15-<20 years	28.5
20+ years	8.0
<b>Monthly income</b>	
Enough	80.0
Not enough	11.0
Enough and saving	9.0
<b>Training courses</b>	
Yes	70.5
No	29.5
<b>Working hours/day</b>	
8-9 hours	100.0

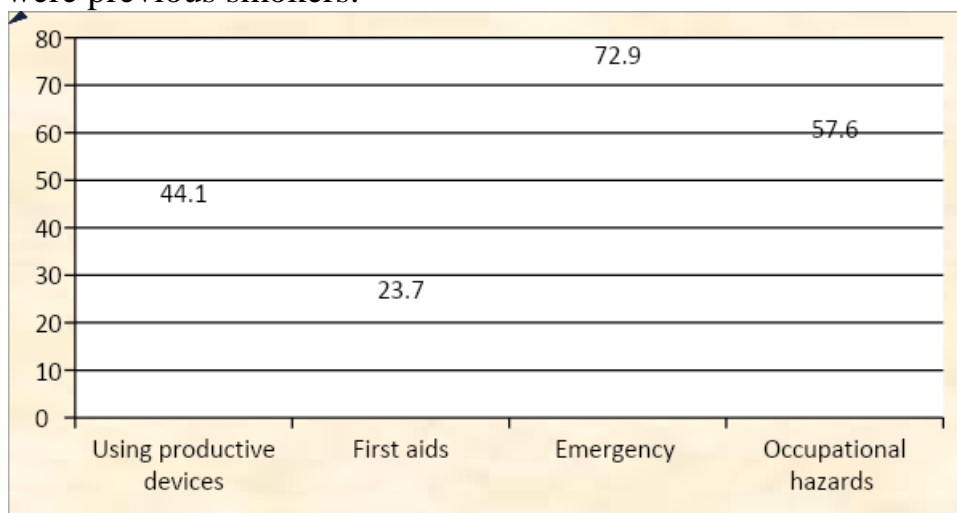


**Table (1):** Shows that, 37% of the studied workers their age was between 30-<40 years with mean age was  $40.6 \pm 9.22$ , while 75% of them lived in rural areas and 65.5% of them were married. Regarding to educational level, 60 % of the studied workers had secondary education. This table also shows that, 32% of the studied workers had past experience from 5-< 10 years in this Factory, 80% of them had enough monthly income and all of them worked 8-9 hours per day.



**Figure (1):** Percentage distribution of the studied workers regarding smoking (n=200).

This figure clears that 66% of the studied workers were smokers and 16% of them were previous smokers.



\*Responses are not mutually exclusive

**Figure (2):** Percentage distribution of the studied workers regarding type of previous training courses (n=141).

This figure illustrates that 72.9% of the studied workers trained on how to deal in an emergency and 23.7% of them trained on first aid



**Table (2):** Percentage distribution of the studied workers regarding to their self-reported health problems in the last six months (n=200).

Health problems	%
Gastro intestinal tract problem	60.0
Respiratory problem	81.0
Eye problem	73.0
Ear problem	54.0
Skin problem	79.0
Musculoskeletal problem	78.0

\*Responses are not mutually exclusive

**Table (2):** Shows that the frequently health problems recorded are respiratory problems which represent 81% and 54% of the workers had health problem in their ears.

**Table (3):** Frequency distribution of the studied Factory environment (n= 1).

Environmental items	Present		Not present	
	N	%	N	%
Existence of ventilation systems in areas with machines	1	100.0	0	0.0
Floors work surfaces and stairs are not slippery	1	100.0	0	0.0
Passages are free from obstacles and bad threats	1	100.0	0	0.0
Passages are clearly marked by the safe movement of people and materials	1	100.0	0	0.0
Solid waste is removed from the work area easily	0	0.0	1	100.0
Empty barrels storage removed from the work area	1	100.0	0	0.0
The floor is clean and free from chemical leakage	0	0.0	1	100.0
Drains provided with covers and free of clogging	1	100.0	0	0.0
All lights are working and suitable for working environment	0	0.0	1	100.0
The toilets are clean and in good condition	0	0.0	1	100.0
Drinking water is pure and available to workers	0	0.0	1	100.0
Chemical containers covered	1	100.0	0	0.0
Flammable materials are far from sources of ignition	1	100.0	0	0.0
Chemical containers are safe and tidy for leakage	1	100.0	0	0.0
There are at least two emergency exit points in the work area	1	100.0	0	0.0
Rescue equipment and emergency medical assistance are available and the location is noticeable	1	100.0	0	0.0
Safety devices (covers, swords and belts) are in place	1	100.0	0	0.0
Enough space is available around the machine to allow maintenance	1	100.0	0	0.0
Safety signs are installed and in good order	1	100.0	0	0.0
The "smoking prevention" rule is followed by all workers	1	100.0	0	0.0
Warning alarm system tested and operated	1	100.0	0	0.0



**Table (3):** Reveals that all the studied work environment of Leather Tanning Factory provided with ventilation systems in areas with machines, floors, work surfaces and stairs were not slippery, passages were free from obstacles and bad threats and clearly marked, chemical containers were safe and tidy for leakage and safety signs were installed and in good order.

**Table (4):** Differences between knowledge scores of the studied workers' regarding occupational health hazards at Leather Tanning Factory pre and post program (n=200).

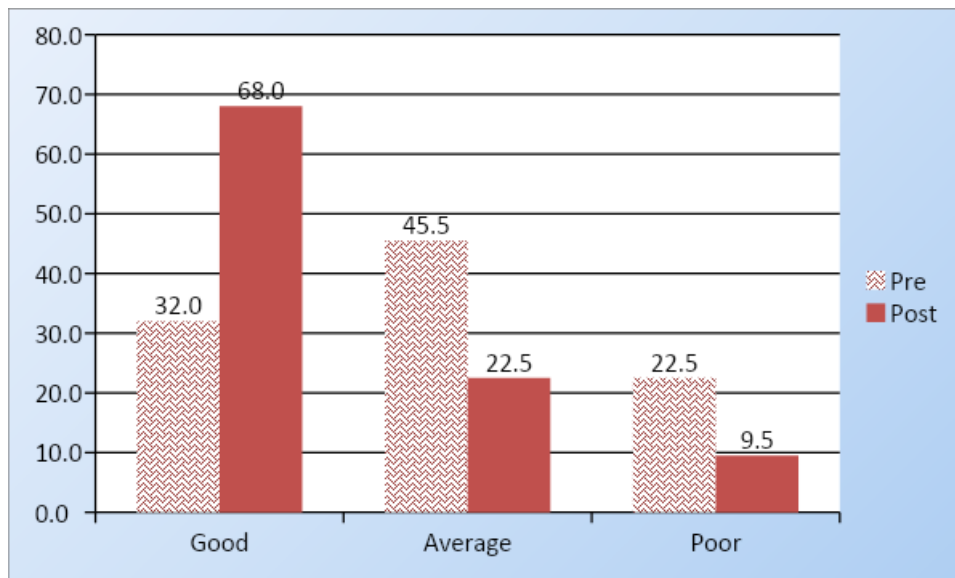
Occupational hazards knowledge	pre- program			post- program			X2	p-value
	Complete & correct answer	Incomplete & correct answer	Don't know	Complete & correct answer	Incomplete & correct answer	Don't know		
	%	%	%	%	%	%		
Meaning of occupational health hazards	24.0	49.5	26.5	72.0	24.0	4.0	98.8	≤ 0.001**
Types of occupational health hazards	38.0	41.5	20.5	60.0	36.0	4.0	29.9	≤ 0.001**
Causes of occupational health hazards	38.0	57.0	5.0	82.0	17.0	1.0	80.8	≤ 0.001**
Health problems which result from occupational health hazards	40.0	56.0	4.0	55.0	42.0	3.0	9.02	≤ 0.001**
Prevention of occupational health hazards	21.5	46.5	32.0	47.0	49.0	4.0	32.2	≤ 0.001**

**\*\*Highly significant difference  $p \leq 0.001$**

**Table (4):** Shows that there were improving in the studied workers' knowledge pre and post program. Regarding the meaning of occupational health hazards, 24% of the studied workers had complete and correct answer pre-program compared with 72% at post- program. Concerning causes, 38% of the studied workers had complete and correct answer pre-program which increased to 82% post- program. In addition, the table also shows that there were highly



statistically significant differences in the items related to the studied workers' knowledge about occupational health hazards, where  $p < 0.001$ .



**Figure (3):** Percentage distribution of the studied workers' total knowledge scores regarding occupational hazards at Leather Tanning Factory pre and post program (n=200).

This figure shows that 32% of the studied workers had good total knowledge scores regarding occupational hazards pre-program, which this percentage increased to 68% post- program.

**Table (5):** Differences between the studied workers' practices scores regarding prevention of occupational hazards at Leather Tanning Factory pre and post program (n=200).

Items of practices about prevention of occupational health hazards	pre- program		post- program		X <sup>2</sup>	p-value
	Done	Not done	Done	Not done		
	%	%	%	%		
Physical health hazards	38.0	62.0	89.0	11.0	34.4	$\leq 0.001^{**}$
Biological health hazards	32.5	67.5	87.0	13.0	23.5	$\leq 0.001^{**}$
An ergonomic health hazards	16.0	84.0	79.0	21.0	59.1	$\leq 0.001^{**}$
Chemical health hazards	53.0	47.0	85.0	15.0	47.8	$\leq 0.001^{**}$
Psychological health hazards	0.0	100.0	28.0	72.0	65.1	$\leq 0.001^{**}$

**\*\*Highly significant difference  $p \leq 0.001$**

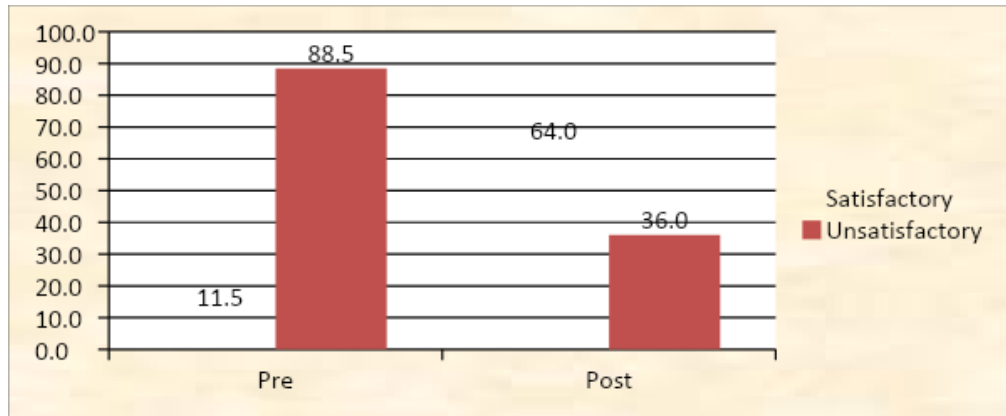


**Table (5):** Shows that there were improving in the studied workers' practices regarding prevention of occupational health hazards pre and post-program. 38 % of the studied workers did practices regarding prevention of physical hazards pre-program, which this percentage increased to 89% post-program, 32% of them did practices regarding prevention of biological hazards pre-program compared with 87% during post- program. There was a highly statistically significant differences between practice items regarding prevention of occupational health hazards pre and post program, where  $p < 0.001$ .

**Table (6):** Percentage distribution of the studied workers practices regarding wearing of personal protective equipment pre and post program (n=200).

Personal protective equipment	Pre- program			Post- program			X2	p-value
	Available and using	Available and not using	Not available	Available and using	Available and not using	Not available		
	%	%		%	%			
<b>Uniform</b>	80.0	20.0	0.0	94.0	6.0	0.0	16.6	0.000**
<b>Head cover</b>	0.0	0.0	100.0	0.0	0.0	100.0	-	-
<b>Eye glasses</b>	0.0	0.0	100.0	0.0	0.0	100.0	-	-
<b>Gloves</b>	73.0	27.0	0.0	88.0	12.0	0.0	15.11	0.001**
<b>Ear protection</b>	0.0	0.0	100.0	0.0	0.0	100.0	-	-
<b>Mask</b>	46.0	54.0	0.0	82.0	18.0	0.0	56.42	0.000**
<b>Apron</b>	77.0	23.0	0.0	85.0	15.0	0.0	3.25	0.196
<b>Safety shoes</b>	35.5	64.5	0.0	61.0	39.0	0.0	20.57	0.000**

**Table (6):** Shows that 80 % of the studied workers used available uniform pre-program and then this percentage increased to 94% post- program and 73% of them used available gloves pre-program compared with 88% post program.



**Figure (4):** Percentage distribution of the studied workers' total practices scores regarding prevention of occupational hazards at Leather Tanning Factory pre and post program (n=200).

This figure reveals that only 11.5% of the studied workers had satisfactory total practices scores regarding prevention of occupational hazards pre-program compared with 64% post – program.

**Table (7):** Relation between studied workers' socio-demographic characteristics and their total knowledge scores pre and post program (n= 200)

Socio-demographic characteristics	Total knowledge pre-program			Total knowledge post- program		
	Poor (n=45)	Average (n=91)	Good (n=64)	Poor (n=19)	Average (n=45)	Good (n=136)
	%	%	%	%	%	%
<b>Age</b>						
20-< 30	26.7	18.7	28.1	15.8	13.3	27.9
30- < 40	55.6	35.2	28.1	42.1	48.9	33.1
40 - <50	17.8	28.6	37.5	31.6	20.0	31.6
50 -<60	0.0	17.6	6.3	10.5	17.8	7.4
	$X^2 = 21.4$ P value = $\leq 0.05^*$			$X^2 = 11.2$ P value = 0.08		
<b>Educational level</b>						
Don't read and write	0.0	0.0	34.4	0.0	0.0	16.2
Read and write	0.0	15.4	9.4	10.5	8.9	10.3
Basic education	31.1	13.2	18.8	36.8	26.7	14.0
Secondary education	68.9	71.4	37.5	52.6	64.4	59.6
	$X^2 = 66.9$ P value = $\leq 0.001^{**}$			$X^2 = 17.1$ P value = 0.009		
<b>Years of experience</b>						
<5 years	26.7	18.7	3.1	15.8	13.3	16.2
5-<10 years	51.1	19.8	37.5	31.6	42.2	29.4
10-<15 years	8.9	24.2	9.4	10.5	8.9	19.1
15-<20 years	13.3	22.0	46.9	31.6	17.8	30.9
20+ years	0.0	15.4	3.1	10.5	17.8	4.4
	$X^2 = 51.8$ P value = $\leq 0.001^{**}$			$X^2 = 17.3$ P value = 0.07		

\*Statistically significant difference  $p \leq 0.05$  \*\*Highly significant difference  $p \leq 0.001$



**Table (7):** Shows that there were highly statistically significant differences between workers' total knowledge scores and workers' socio-demographic characteristics as educational level and years of experience pre-program implementation.

**Table (8)** Relation between the studied workers socio-demographic characteristics and their total practices' scores pre and post program (n= 200).

Socio-demographic characteristics	Total practices scores pre- program		Total practices scores post- program	
	Unsatisfactory (n=177)	Satisfactory (n=23)	Unsatisfactory (n=72)	Satisfactory (n=128)
	%	%	%	%
<b>Age</b>				
20-< 30	24.3	17.4	19.4	25.8
30- < 40	35.6	52.2	36.1	38.3
40 - <50	29.9	21.7	33.3	26.6
50 -<60	10.2	8.7	11.1	9.4
	$X^2=2.42$	<b>p-value= 0.49</b>	$X^2=1.71$	<b>p-value= 0.63</b>
<b>Educational level</b>				
Don't read and write	12.4	0.0	19.4	6.3
Read and write	11.3	0.0	11.1	9.4
Basic education	11.9	73.9	13.9	21.9
Secondary education	64.4	26.1	55.6	62.5
	$X^2=51.68$	<b>P value= ≤ 0.001**</b>	$X^2= 9.34$	<b>p-value = ≤ 0.05*</b>
<b>Years of experience</b>				
<5 years	17.5	0.0	11.1	18.0
5-<10 years	29.9	52.2	33.3	32.0
10-<15 years	16.4	13.0	16.7	15.6
15-<20 years	27.1	34.8	30.6	26.6
20+ years	9.0	0.0	8.3	7.8
	$X^2=9.77$	<b>p-value= ≤ 0.05*</b>	$X^2=1.73$	<b>p-value= 0.78</b>

\*Statistically significant difference  $p \leq 0.05$  \*\*Highly significant difference  $p \leq 0.001$

**Table (8):** Shows that there was statistically significant relation between the studied workers' total practices score and their years of experience pre-program implementation.





**Table (9):** Correlation between the studied workers' total knowledge scores and their total practices scores pre and post program (n=200).

Items	Total knowledge scores			
	Pre-program		Post- program	
	r	P-value	r	P-value
<b>Total practices scores</b>	0.57	0.000**	0.24	0.07

**Table (9):** Shows that there was a positive statistically significant correlation between the studied workers' total knowledge scores and their total practices scores pre and post program.

## Discussion

Leather industry is considered to be a major source of hazards and tannery wastes in particular is potential environmental concern. The process of converting hides and skins into leather is termed as tanning process. In tanning process the animal hides and skins are treated, becomes more permanently resistant to decomposition when they are wet and supple when dry. The process of tanning requires consumption of vast quantities of water and chemicals, which in turn constitute pollutants to the surrounding environment and workers if not treated to a certain degree (Ibrahim, 2017).

Regarding to socio-demographic characteristics of the studied workers, this study showed that less than half of the studied workers aged between 30- <40 years old with mean age  $40.6 \pm 9.22$  (table 1). This might be due to this age of formulating family and need for work to get income. This finding agreed with **Seyoum (2014)**, who assessed the "occupational skin diseases and associated factors among tannery workers of selected tanneries, Addis Ababa, Ethiopia", who reported that the majority of the study subjects age ranged from 18 to 30 years old with a mean age of 39.66.

Regarding to the residence, marital status and educational level



of the studied workers, the results of the present study revealed that more than two thirds of the studied workers lived in rural areas; more than half of them were married and had secondary education respectively (table 1). This might be due to increase level of unemployment in Egypt, or that employment in Egypt is limited to graduates of colleges and persons lived in rural areas worked early to increase level of income. These findings disagreed with **Islam et al. (2017)**, who studied "occupational health hazards and safety practices among the workers of tannery industry in Bangladesh" and reported that less than half of the studied participants were illiterate (37.5%) and the majority of them were married (84%).

Regarding to smoking habits, the present study showed that more than half of the studied workers were smokers (figure 1). This finding was in the same line with **Arjunan, (2017)**, who conducted study on "Tannery worker's health problems in Erode District" and reported that more than half of the study subjects were smokers (60.5%) and the smoking was known as risk factor that causing lung cancer and morbidity conditions among workers and predispose for poor health value.

As regards to type of training courses, the results of the present study showed that less than half of the studied workers trained on how to use protective devices (figure 2). This might be due to decrease health education about importance of attending training courses in the Factory. This finding agreed with **Yogaraj et al. (2018)**, who studied "A cross-sectional study on morbidity pattern among Leather Factory workers at Sripuram, Chennai, Tamil Nadu, India", and found that less than half of the study participants (40%) used protective devices and had training courses on it.

Regarding to the studied workers self-reported health problems in the last six months, the results of the present study revealed that more than three quarters of the studied workers had health respiratory problems in the last six months, (table 2). This might be due to chemicals that used in tannery industries for the preservation of raw hides, like chromium salts have the potential to bind with skin proteins. This could produce complex antigens and lead to hypersensitivity and subsequently to the development of respiratory diseases. This finding agreed with **Dalju et al. (2019)**, who



studied "Occupational risk factors associated with respiratory symptoms among tannery workers in Mojo town, Southeast Ethiopia" and reported that more than two thirds of the study subjects had health problems in their respiratory system as cough, wheezing, dyspnea and phlegm (70%).

Concerning the environmental work setting, the present study showed that all the studied tannery workplace provided with air extraction and ventilation systems in areas with machines (table 3). This might be due to the nature of the work at tannery need good ventilation and air extraction systems in areas with machines. These findings disagreed with **Azom et al. (2018)**, who studied "Environmental impact assessment of tanneries: A Case Study of Hazard in Bangladesh", and found that the majority of the studied tannery workplace had poor ventilation system in the areas of machines in the workplace.

Concerning the studied workers' knowledge regarding occupational health hazards, the present study revealed that there were highly statistically significant improvements in the studied

workers' knowledge pre and post program (table 4). This might be due to occupational health program that gave to them and spread of mass media in Egypt had an important role in raising awareness of workers. These findings disagreed with **Awosan et al. (2018)**, who studied "Knowledge of workplace hazards, safety practices and prevalence of workplace related health problems among Sawmill Workers in Sokoto, Nigeria" who reported that more than two thirds of the study participants had good knowledge about their workplace hazards before implementation of the program.

Concerning total knowledge score of the studied workers regarding occupational health hazards, the present study revealed that one third of the studied workers had good total knowledge score pre the program (figure 3). This might be due to their level of education helped them to acquire knowledge from occupational health program. This finding agreed with **Abd El- Azeem, (2016)**, who studied "Occupational health hazards among leather tannery workers, Egyptian Tanneries in Old Cairo Area" and found that less than three quarters of the study participants (72%) had poor total knowledge score before the program



implementation because less than half of the workers their educational level were read and write (42.8%).

In relation to the studied workers' practices regarding prevention of occupational health hazards, the present study revealed that there were highly statistically significant improvements in the studied workers' practices in all items of occupational hazards pre and post program (table 5). This might be due to some of the studied workers didn't train on these practices regarding occupational hazards before from any persons but this improvement result from occupational health program.

Concerning to the studied workers' practices regarding the wearing of personal protective equipment pre and post program, the present study illustrated that around three quarters of the studied workers used available gloves, less than half of them used available masks, more than three quarters of them used available apron and around one third of them used available safety shoes preprogram (table 6). These findings disagreed with **Hasan et al. (2016)**, who studied "Prevalence of health diseases among Bangladeshi Tannery Workers and associated risk

factors with workplace investigation" and found that 26.1% of the study participants wear gloves and masks respectively while 2.2% of them wear apron and 16.3% of them wear safety boots. According to **Amabye (2016)**, who studied "Occupational risks and hazards exposure, knowledge of occupational health and safety practices and safety measures among workers of Sheba Leather in Ethiopia" and reported that half of their workers had unsatisfactory score related to practices of using personal protective devices.

Regarding to total practices score of the studied workers regarding occupational health hazards, the present study revealed that around two thirds of them had satisfactory total practices scores post program implementation (figure 4). This might be due to the effect of occupational health program which improves their practices to prevent occupational hazards and their knowledge increased after the program implementation.

In the current study there were highly statistically significant relation between the studied workers' total knowledge score and their socio-demographic characteristics as



years of experience preprogram (table 7). This might be due to more than one quarter of them had past experiences from six to ten years in the working which may lead to increase level of knowledge. This finding agreed with **Abd El- Azeem (2016)**, who reported that there were highly statistically significant relation between total knowledge score of their workers and their years of experience.

In the current study there was statistically significant relation between the studied workers' total practices score and their socio-demographic characteristics as educational level post program (table 8). This might be due to some of the workers trained on how to use protective devices and might be explained by the fact that educated person like to know what things benefit them and what may cause harm. This finding agreed with **Padma et al. (2016)**, who studied "Occupational health hazards among the workers in Leather Tanneries near Chromppet, India" and reported that there was statistically significant relation between total practices score of their workers and their educational level.

In the current study there was a positive significant correlation between the studied workers' total knowledge score and their total practices score pre and post program implementation (table 9). This might be due to importance of correct knowledge for good and right practices. This finding agreed with **Basak et al. (2019)**, who studied "A study on occupational health and safety practices in Bangladeshi Leather Industry, Dhaka" and reported that there was a positive statistically significant correlation between total knowledge score of their workers and their total practices score.

## Conclusion

**Based on the results of the present study and research hypothesis, the study concluded that:**

More than one third of workers their age was between 30-<40 years with mean age was  $40.6 \pm 9.22$ , and more than one quarter of them had past experience from 6-10 years in this Factory. More than three quarters of the studied workers had health respiratory problems in the last six months The program succeeded to enhance knowledge and



improve practices of the studied workers. Slightly less than one third of the studied workers had good total knowledge scores pre-program, which this percentage increased to more than two thirds post- program. The minority of the studied workers had satisfactory total practices scores regarding prevention of occupational hazards pre-program compared with less than two thirds of them post program. There was a positive statistically significant correlation between workers' total knowledge scores and their total practices scores regarding occupational health hazards pre and post program.

## Recommendations

### Based on a finding of the present study the following recommendations:

- Apply the occupational health program for leather tanning workers regularly to increase their knowledge and their practices to prevent occupational health hazards.
- Make regular periodic screening for leather tanning workers for early detection of any health problems
- Provide all the basic required protective equipment for

workers to prevent hazards in the Factory.

- Further studies are proposed to explore the occupational health hazards among leather tanning workers to prevent the complication among workers.

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