

## Occupational health: Health Promotion Program to Improve Health Workers in Tourah Cement Factory

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**Abstract:** Workers in the cement sector are exposed to many occupational hazards which may contribute to diseases and work injuries. **The study aimed** to evaluate the effect of health promotion program to improve health workers in Tourah cement factory. **Study design:** A quasi –experimental design was used.. The **study sample** comprised 350 workers selected randomly in Tourah cement factory. **Two tools** were used for data collection: 1) Interviewing questionnaire sheet and 2) Observational checklist. **Results:** showed that two thirds of the studied workers were exposed to skin disorders and sinusitis (65.7% & 62.8%). More than half of the studied workers were exposed to hearing disorders (50.5%), more than two fifths were complaining from chronic cough (42.8%), nearly two thirds of the studied workers were had poor knowledge about different types of personal protective equipment and occupational diseases in cement factory, almost two thirds of the studied workers (67.1%) complained from musculoskeletal disorders; 56.1% from hypertension. There were statistically significant difference between before and after program implementation concerning workers health ( $P = <0.001$ ). The **study concluded** that according to the findings and research hypothesis health promotion program will improve the workers knowledge, attitude and practices regarding safety measures This was obvious In table 5,6,7 that showed statistical significant improvement before a and after implementation of the health promotion program regarding knowledge, attitude and practice. The study **recommended** the need for stressing on the application of International Standard Occupational Health and Safety Assessment Series, in field work to improve occupational health and safety performance for workers, periodic check up for workers for early detection of occupational hazards to monitor the health status and early case finding, periodic educational training for all workers in cement factory about the occupational hazards, emphasizing on the importance and usefulness of personal protective equipment to be used in the right way and first aid for promotion of personal fitness of the workers by healthy promotion programs.

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**Key word:** Cement factory, occupational hazards, personal protective equipment, international standard organization.

### 1. Introduction

Factories represent one of the most important strategic manufactures and a basic element in the economic development of any country .Workers in the sector factories constitute an important productive aggregate in the community ( **David, et al., 2005 & Baskett, 2007**).

Work is viewed as important to one's life experience; most adults spend about fulfilling one third of their time at work. About 45% of the world's population and 58% of the population over 10 years of age constitute the global workforce(**Rogers, 2005**) and (**Gupta, & Ghai, 2007**).

Workers expose them to different hazards, which may have tremendous harmful effect on their health. These hazards may result from physical, chemical or mechanical agents (**El - Sobky, 2008**). Cement can cause ill health by skin and eye contact, or inhalation. Risk of injury depends on duration and level of exposure and individual sensitivity. Cement dust causes lung function impairment, chronic obstructive lung disease, restrictive lung disease, pneumoconiosis and carcinoma of the lung, stomach and colon (**Saucier& Janes , 2004**).

The factory is consists of six sectors and it produces about 2.4 tons of cement every years. There are about 3502 workers and employees. The work system in the factory is one shift and its shift is 9 hours every day as well as the work is 5 days/week (**Report from Environmental Affairs,2010**).

Workers in cement factory are exposed to various health hazards in the different departments of cement factories. Especially, in all stages of production (rock quarry clinker kiln, cement mill, concrete plant, building & roads and reuse, recycle or dispose of construction products) sections play a role in the high incidence of factories health hazards (**David, et al., 2005 & Herzstein, et al., 2006**).

The chemical hazards arise from excessive air born concentrations, chemicals could occur through either inhalation, dermal or ingestion and through contaminated hands. These toxic chemicals may have acute or chronic effects on the workers. Acute effects such as dizziness, headache, nausea, vomiting, sleepiness, fatigue, slurred speech, disequilibrium, loss of consciousness, respiratory tract irritation, acute pneumonitis, a plastic anemia, leukemia, kidney, bladder, lung cancer, lymph sarcoma, and pulmonary

edema (Plog et al., 2004). Occupational injuries as trauma, fracture and wounds represent the leading cause of morbidity and mortality among workers (El - Sobky, 2008).

Occupational health nurse has a major role in identifying occupational hazards, determining workers health problems, early case finding, management and referral to the appropriate community health resources (Plog, et al., 2004 & Mercury, et al., 2009). As well, the occupational health nurse analyzes each job task to detect task situations that place employee at risk through assessment and surveillance of the workplace to identify potential hazards increasing with the work, reducing risk, and minimizing risk problems (Harris, 2007).

#### Significance of the study:

The current generation of Egyptian workers in numerically estimated 22,875,573 persons in 2005, it is estimated that about 12066 (11777 males & 289 females) of total workers employed in cement factories in Egypt (Central Agency for Public Mobilization and Statistics, 2006).

Occupational health and safety affect not only the worker but also on his family and significant others and his community. In addition to, occupational health nursing is the specialty practice that focuses on the promotion, prevention, and restoration of health within the context of a safe and healthy environment; this includes the prevention of adverse health effects from occupational and environmental hazards. It provides also delivering occupational and environmental health and safety services to workers, work populations, and community groups (Lundy & Janes, 2005, & Salazar, 2006).

#### Aim of the study:

This study was carried out to evaluate the effect of health promotion program to improve health workers in Tourah cement factory.

#### Through:

Assessing the health status of workers towards safety measures to detect workers needs.

- Assessing occupational risk factors and the occurrence of occupational health hazards.
- Developing and implementing health promotion program based on the previously detected needs of workers toward safety devices.
- Evaluating the health promotion program on improving the workers knowledge, attitude and practice toward safety measures.
- Measuring the extent the Occupational Health and Safety Assessment Series (OHSAS, 2008) have application in the field of work.

#### Hypothesis:

A health promotion program may have direct or indirect effect on improve the workers knowledge, attitude and practice toward safety measure .

#### 2. Materials and Methods:

##### Research design:

A quasi –experimental research design was used in carrying out the study.

##### Research setting:

This study was carried out in the cement Tourah factory. This factory was established at Helwan district.

##### Samples:

The purposive sample consisted of 350 of workers and employees. They were randomly chosen using the proportion allocation methods. The total number of factory cement workers were 3502 in years 2010, 10% of the workers were included in the study (their number through systematic random sample with a proportion of 1: 10. from each of the setting of cement factory.

##### Tools of the study:

Two tools were used for data collection:

**Tool I:** A structured interview questionnaire was designed and utilized by the researchers to collect the necessary data. It is divided to seven parts and entailed the following items:

- **The first part** includes questions related to socio-demographic characteristics of the workers such as age, level of education, occupation etc.

- **The second part** include questions related to presence of chronic diseases such as family history, past and present medical history for workers.

-**The third part** include questions related to occupational risk factors such as; types of exposure to occupational hazards during the working day, physical, accident, and chemical.

-**The fourth part** includes questions related to past and present occupational hazards history. This part is composed of open-ended questions to collect data from workers and health records. It covers the types of past and present occupational hazards history.

-**The fifth part** includes questions related to workers knowledge about safe working environment, personal protective equipment ,how to protect themselves from occupational hazards and importance of using it, types of occupational hazards and their effects on their own health, , source of information and most common diseases.

##### Scoring system:

Measuring the score of workers knowledge toward occupational hazards: a known item was scored one point (1), and an unknown item was scored zero (0).

These scores were converted into percent score. The workers knowledge was evaluated good  $\geq 75\%$ ; while it was considered average if the percent score was less than 75% to more than 50% or more ;and poor if the percent score was less than 50%.

**The sixth part** include questions related to workers attitude toward safe work practices using a rating scale of the 3 level positive attitude, 2 marks; indifferent ,1 mark; and negative attitude,0.

**Scoring system:**

Measuring the score of workers attitude toward safe work practices:

A positive attitude item was scored two points (2), an indifferent attitude item was scored one point (1), and a negative attitude item was scored zero (0).

These scores were converted into percent score. The workers attitude was evaluated good  $\geq 75\%$ , while considered average if the percent score was less than 75% and more than 50% and poor if the percent score was less than 50%

**-The seventh part** included questions related to workers first aid practices regarding to occupational health hazards using a rating scale of 2 levels; a know (1) mark, an unknown (0) because it is a positive practice when contact between chemical materials, eye and skin surface, flying dust in the eye, toxic ingestion, falling of a person from height, asphyxiation, bleeding and fire accident.

**Scoring system:**

Measuring the score of workers practices toward occupational hazards: A known item was scored one point (1) , An unknown item was scored zero (0).

These scores were converted into percent score. The workers practice was considered good: if the percent score was  $\geq 75\%$  , while was considered average if the percent was less than 75% and more than 50% and poor if percent score was less than 50%.

**Tool II:** Observation checklist sheet of OHSAS(2008) application

Checklist observation sheet was modified to evaluate the extent of OHSAS application in the field work. This part is composed of 26 closed-ended questions which cover the ventilation, lighting, hazard identification, risk assessment and risk control, training, documentation and records, emergency readiness, accident and incident investigation, corrective and preventive action, application and relevance in the factories. In addition to improved company image by demonstrating a commitment to manage and minimize risks to employees (**EH & S Management System, 2008**).

**Scoring system:**

Evaluating the score of observational checklist sheet of OHSAS(2008) application, it was as follows: a good applicable items was scored one point(1) , and poor application item was scored zero (0).

**The elements of OHSAS 18001(2008) include :**

1. Policy and commitment
2. Hazard identification, risk assessment& risk control.
3. Legal requirement.
4. Objective and programs.
5. Organization and personal.
6. Training, communication and consultation.
7. Documentation and records.
8. Operational controls.
9. Emergency readiness.
10. Measurement and monitoring.
11. Accident and incident investigation, corrective and preventive action.
12. Audit and review.
13. Application and relevance in the factory.

Improved company image by demonstrating a commitment to manage and minimize risks to employees and customers (**EH&S. Management system, (2008)**).

**Field work:**

The actual field work started from January 2010, to July, 2010. A formal letter was issued from the Faculty of Nursing, at Helwan University to the Chairman of the Board of Cement factory requesting approval for conducting this study. Following, the researchers explained the purpose and process of the study to the workers and got their oral consent to participate in it. The researchers emphasized strongly that the information collected would be used for scientific research only, would be confidential, will be studied to improve their case prevalence related to exposure to occupational hazard.

The interviewing questionnaire was held with each workers with the researchers to obtain the exact meaning from them for about 20-30 minutes in the foreman room, after that the researchers read questionnaires then explained each element simply and briefly.

The health promoting program was developed based on reviewing of related literature and the result of the assessment tools (pretest).

Content validity of the tool was checked by a panel of five experts from the Community Health Nursing specialty and modifications were done based on their opinions.

A pilot study was carried out on 35 workers from three departments in order to test clarity and applicability of the tool. The pilot study was also used to estimate the time needed for each subject to fill in the questions. Modifications were done based on the results of the pilot study. Those who shared in the pilot study were excluded from the main study sample.

**Health promotion program construction: It** consisted of three phases:

**First, preparatory and assessment phases:**

A review of recent, current, national and international related literature in various aspects, to design the study tools.

### Second, planning and implementing phases:

- General objective: The objective of health promotion program were to improve the health workers through improving their knowledge, attitude, and practices towards safety measures in factory environment.
- Content of the program content PPE, types, availability, safe work environment, and first aid in case of occupational hazards.
- The program was implemented over a period of 7 months; it was carried out in 7 sessions (time allowed 8 hours distributed on 7 sessions: 5 hours for theory and 3 hours for practice. The duration of each session ranged from 30 - 90 minutes.
- At the beginning of each session, the researchers started by a summary about what was given through the previous sessions and objectives of the new one, taking into consideration using simple and clear language to suit the participants level of understanding.
- Different teaching methods were used including lectures, group discussion, demonstration and re-demonstration, and role-play to implement the program.
- The educational media were brochures, colored posters, laptop screen show and real objects.
- At the end of each session, the workers were informed about the content of the next session and its time

### Third, the evaluation phase:

- Evaluation was based on scores of acquired knowledge, attitude and practices in pre-test and immediate post-test.

### Ethical considerations:

During the interview, the workers were informed about the nature of the study, and the right to withdraw at any time, or refuse to answer specific question without giving any reason. Workers verbal agreement to participate was obtained. Confidentiality of their names and information was regarded.

### Statistical Analysis:

After data were collected, they were coded and transferred into special design formats to be suitable for computer feeding. The Statistical Package for Social Science (SPSS) version 14 was utilized for statically analysis and tabulation as well as some graphic presentations of the results.

### 3. Results:

**Table (1)** shows that the age of the workers ranged from 20 to 60 years, with a mean age of  $42.769 \pm 8.126$  years. 70% of the workers had a diploma of secondary technical industrial school and, 14.9 %

had primary or preparatory education. 76.9 % of workers were married. Regarding to the types of work, the table shows that 53.2 % were working in the factory as technical operators, and 27.2% as technical maintenance in the various settings. The rest were either supervising the work on the computer system or assuming administrative work in offices. As well as, the duration of employment ranged from  $2 \geq 40$  years with a mean  $(27.576 \pm 6.120)$ .

**Table (2)** presents workers, risk of exposure to the various occupational hazards that might affect the workers health. These are physical, accident due to mechanical hazard, chemical and other health problems. Regarding physical hazards the table shows that ear problems (29.2 %) are the most common physical hazard in the work area, this was followed by high blood pressure representing 26.9 % of the workers. 23.2 % were exposed to fracture from accident followed by falling 22.9 %. Also, 19.2% were exposed to eye disorders, followed by hematological disorders, cardiovascular problems and partial or complete deafness 14.3 % , 10.3 % & 9.5 % respectively.

In addition, 35.2% was exposed to eye irritation or allergy due to chemical hazard and there were highly statistical significant differences regarding to the risks of exposure to health problems and accidents.

Table (3) shows that the most frequent chronic complaints from chronic diseases were musculoskeletal disorders (67.2 %), skin disorders (65.7 %), sinusitis (62.9 %) , hypertension ( 57.1 %) , hearing disorders ( 50.6 %), diabetes ( 34.3 %) and bronchitis and chronic cough (42.9 %). While, 8.6 % were complained from liver disease and silicosis (2.9 %).

**Table (4) and Figure (1)** reveal that there were highly statistically significant relations regarding to first aid ( $P < 0.000$ ). Regarding to the past history of occupational injuries during 2009, the studied sample suffered from work injuries, accounting for 25.4 % of the injuries resulted from trauma, fractures and wounds. From the first aid providers, 23.6% were colleagues and 76.4 % were physicians. Concerning the place of treatment, for 65.7 % it was in the company's clinic and only, 18.0% in the injury site. Considering injury outcome, more than one quarter of reported record (26.0%) had temporary disability.

**Tables (5)** represents that 65.7 % of the studied sample were not wearing PPE, but only 34.3 % of workers used PPE. 34.3 % of workers studied using aprons as one of PPE followed by goggles (28.0%). Concerning availability of PPE (78.0%) reported that they are not enough in their work area before health promotion program which they differed in post test program to be enough as reported by the majority (85.8 %). There were highly statistical significant difference between pre and post health promotion program related to wearing PPE, its types and availability.

**Table (6):** denoted that workers having moderate knowledge about ventilation were less than two thirds of studied sample (65.7 %) in pre test but most of them increased to (91.4%) in post test. As well, the majority of studied sample in pre test (82.3 %) know about sufficient light, and most of them increased to (94.3 %) in post test. Those who had knowledge about presence of protective equipment in pre test were 78% and increased to 85.7 % in post test .There were highly statistical significant differences between pre and post knowledge related to ventilation, light and presence of personal protective equipment.

**Table (7)** as seen in the tables, more than three quarters of the studied sample had positive attitude about the regular medical checkup as very important in cement factory (77.1 %) , the majority of the studied sample had positive attitude about the relation between occupational hazard and job nature (85.4 %). More than three quarters of the studied sample had positive attitude about wearing the personal protective equipment is very important in cement factories (85.7 %). More than half of the studied sample had negative attitude about the relation between occurrence of occupational disease and not wearing PPE (5.7 %). There were highly statistically significant differences between pre and post attitude related to positive, indifferent and negative variables ( $P < 0.000$ ).

**Table (8)** show the reported practice of the studied sample toward first aid program in case of exposure to different occupational hazards. It is obvious that most of the studied sample had poor practice in case of contact between chemical materials and eye (86.4%) , entry of flying dust in the eye (86.3 %), ingestion of toxic materials (84.8 %) and falling of persons from the height (77.7 %). However, good performance was not found among all workers in all seven cases of occupational hazards. There were highly statistically significant differences between pre and post practices related to good, average and poor practice ( $P < 0.000$ ).

**Table (9)** shows that presence of good ventilation, sufficient light and fire extinguisher in the factory, ambulance car, and medical clinic inside the factories, pre employment examination. There were also punishment for those workers not using PPE, presence of leisure time for journeys, emergency plan in cases of emergency, application of emergency plan on real ground and presence of specific employees to identify occupational risks. In addition, there was presence of internal auditors to check safety, presence of medical records for each worker and part time during working day. However, there was not enough space between machines, no periodic medical examination, no periodic checking of PPE, no periodic workers training on occupational safety, no role of internal auditors is played and no computerizing of medical records.

**Figure (2)** reveals that there were highly statistically significant differences between workers years of experience, and knowledge, attitude and practices of the workers ( $P < 0.000$ ).

#### 4. Discussion:

Cement factories represent one of the most important strategic manufactures and a basic element in the economic development of any country (**Mansour, 2008**). As well, their workers constitute an important productive sector of the community and consequently are the wealth and welfare of the nation (**Hamdy, 2007**). Those workers are exposed in their working environment continuously to either potential or actual hazards which have an impact on their health whether by acute or adverse serious effects (**Rom, 2008**).

According to socio-demographic characteristics of the study sample indicates that the age of the workers ranged from 20 to 60 years. This finding is consistent with the results of **Shabani, et al., (2004)**, who performed a survey about skin problems among cement factories, and reported that 55% of the workers their age ranged from 20 to less than 60 years.

As regards the studied workers, education less than three quarters of the workers had of secondary technical diploma from industrial school, a more than tenth had primary or preparatory education. More than three quarters of workers were married. Regarding to the types of work results showed that more than half were working in the factories as technical operators, and more than one quarter as technical maintenance in the various settings. As well the experience years ranged from 2 to  $\geq 40$  years. This is consistent with the results of **Minamoto, et al., (2004)**, who performed a survey about bronchial asthma among cement factories workers. They reported that 88% of the workers had a technical diploma and 66% were working as technical operators. Other results of **Baletic, et al., (2005)**, who performed a study about chronic laryngitis in cement factories, they reported that 86% of workers had primary education, while 1% is semi-qualified and 13% qualified workers. As regards the studied workers' exposure to the various occupational health hazards that might affect the workers health, these are physical, chemical or accidental due to mechanical hazards and other health problems. The physical hazards show that ear problems are the most common physical hazards observed in the work area, this was followed by high blood pressure of the workers. Slightly less than one quarter of the studied sample were exposed to fractures because of accidents, followed by falling. Also, slightly less than one fifth of the studied sample were exposed to eye problems, followed by hematological disorders, cardiovascular problems and partial or complete deafness respectively.

Table (1): Distribution of the workers in cement Tourah Factories according to their socio demographic characteristics (N= 350).

Socio Demographic Characteristics	No	%
<u>Age/ years:</u>		
20-	102	29.2
30-	85	24.3
40-	112	32.0
50-60	51	14.6
Mean ±SD	42.769±8.126	
<u>Education status:</u>		
Read & write	23	6.6
Primary / preparatory education	52	14.9
Technical diploma	245	70.0
High education.	30	8.6
<u>Marital status:</u>		
Single	37	10.6
Married	269	76.9
Divorced or widowed	44	12.6
<u>Types of work :</u>		
Technical operator	186	53.2
Technical maintenance	95	27.2
Supervisor	21	6.00
Administrator	48	13.8
<u>Experience (years):</u>		
2 years	85	24.3
20 -	177	50.6
≥ 40	88	25.2
Mean ±SD	27.576 ± 6.120	

Table (2): Distribution of the workers according to their risk of exposure to the various occupational hazards. (no =350)

Occupational Hazard	N0	%	X <sup>2</sup>	P-value
<u>Physical hazard:</u>				
Noise	79	22.6		
Ear problems	102	29.2	5.497	0.139
High blood pressure	94	26.9		
<u>Accident :</u>				
Exposure to fracture	81	23.2		
Falling from height	80	22.9	16.086	0.003
Exposure to fall from heavy objects	41	11.8		
Moving mechanical machines	70	20.0		
Nothing	78	22.3		
<u>Chemical hazard:</u>				
Eye irritation or allergy	123	35.2		
Skin problems	227	64.9		
<u>Other health problems:</u>				
Eye disorders	67	19.2	30.903	0.000
Hematological disorders	50	14.3		
Cardiovascular problems	36	10.3		
Partial or complete deafness	33	9.5		
Nothing	164	46.9		

Table (3): Distribution of the workers According to their presence of chronic Diseases (N= 350).

Items	No	%
<u>Family history</u>		
Negative	120	34.3
Positive	230	65.8
Musculo-skeletal disorder	235	67.2
Sinusitis	220	62.9
Skin disorders	230	65.7
Hearing disorder	177	50.6
Bronchitis	150	42.9
Chronic cough	150	42.9
Ophthalmologic condition	97	27.8
Bronchial asthma	80	22.9
Hypertension	200	57.1
Diabetes	120	34.3
Liver disease	30	8.6
Silicosis	10	2.9

Answer are not mutually exclusive

Table (4): Distribution of the workers according to past history of occupational injuries during 2009, their management and outcome (n=350)

Work Injuries During 2009	No	%	X <sup>2</sup>	P-value
<u>Type of injuries:</u>				
Trauma, fractures and wounds	89	25.4		
<u>First aids providers :</u>				
Physicians	68	76.4	24.820	0.000
Colleagues	21	23.6		
<u>Place of treatment:</u>				
Factories clinic	230	65.7		
Injury site	63	18.00	165.297	0.000
Hospital	57	16.3		
<u>Injury outcome:</u>				
Temporary disability	91	26.00		

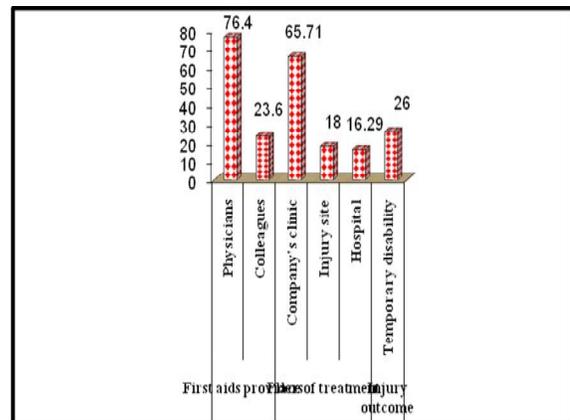


Figure (1) Distribution of the workers according to past history of occupational injuries during 2009

Table (5): Distribution of the workers according to their using of personal protective equipment (n= 350).

Variable	Pre		Post		chi-square	
	No	%	No	%	X <sup>2</sup>	P-value
<u>Personal Protective Equipment (P.P.E)</u>						
Not wearing	230	65.8	100	28.6	96.888	<0.001*
Wearing	120	34.3	300	85.8	192.857	<0.001*
Wearing sometimes	200	57.2	260	74.3	22.826	<0.001*
Wearing all the time	120	34.3	290	82.9	170.143	<0.001*
<u>Type of PPE (among those using PPE):</u>						
Aprons	120	34.3	230	65.8	69.143	<0.001*
Safety gloves	50	14.3	180	51.5	109.436	<0.001*
Respirator	21	6.0	230	65.8	271.313	<0.001*
Ear muff	8	2.3	260	74.3	383.955	<0.001*
Goggles	98	28.0	200	57.2	60.793	<0.001*
Helmets	8	2.3	100	28.6	92.668	<0.001*
<u>Availability of PPE :</u>						
Not enough	273	78.0	100	28.6	171.765	<0.001*
Enough	77	22.0	300	85.8	285.867	<0.001*

All items are not mutually exclusive

**Table (6): Distribution of the workers according to their knowledge regarding safe working environment(n=350).**

Safe Working Environment	Pre		Post		X <sup>2</sup>	P-value
	Correct answer		Correct answer			
	No	%	No	%		
<u>Ventilation :</u>	230	65.7	320	91.4	68.727	0.000
<u>Sufficient Light :</u>	288	82.3	330	94.3	24.367	0.000
<u>Important of PPE :</u>	273	78.0	300	85.7	7.012	0.008

**Table (7): Distribution of the workers according to their pre & post attitude score level as regards occupational safety and work related hazards(n=350)**

Attitude Variable	Positive%		Indifferent%		Negative%		X <sup>2</sup>	P-value
	pre	post	pre	Post	pre	post		
Is prefers to using P.P.E.	34.3	80	31.4	17.1	31.4	2.9	0.588	0.745
There is a relation between hazards and not wearing PPE	57.1	74.3	25.1	20	17.7	5.7	92.183	0.000
Surrounding environment in the factory can lead to occupational hazards	31.7	65.7	43.7	17.1	24.6	17.1	19.651	0.000
Job nature can lead to occupational hazards	85.4	85.7	9.4	11.4	5.1	2.9	428.406	0.000
Wearing of PPE is very important especially in cement factories	85.7	91.4	9.7	5.1	4.6	3.4	433.531	0.000
Regular medical check up is very important in cement factories	77.1	82.86	20	11.4	2.8	5.7	317.714	0.000

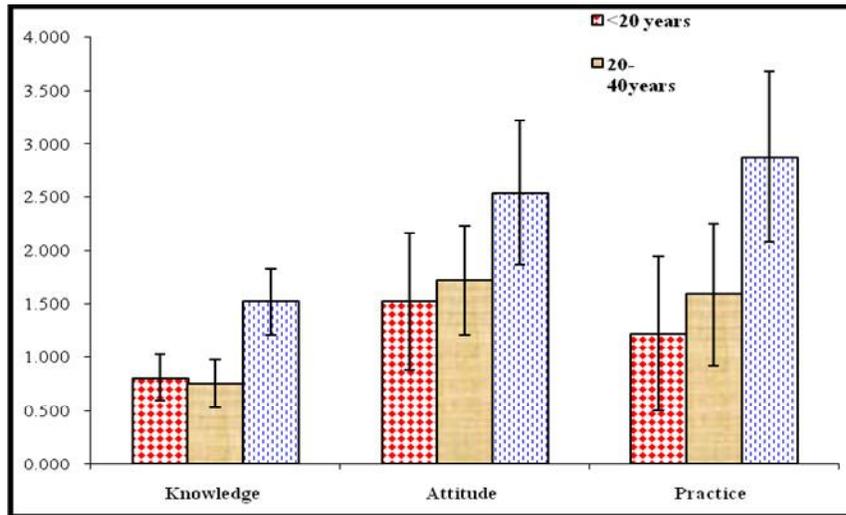
**Table (8) : Distribution of the workers according to their pre and post practice as regards first aid measures in case of exposure to different occupational hazards (no=350).**

Practice in case of occupational hazards	Good %		Average %		Poor %		X <sup>2</sup>	P-value
	pre	post	Pre	post	pre	post		
Contact between chemical material and eye	5.0	65.6	8.6	22.9	86.4	11.5	240.286	0.000
Entry of flying dust in the eye	8.0	68.5	5.7	20.0	86.3	11.5	274.571	0.000
Contact between chemical materials and skin	10.0	80.0	11.4	11.5	78.6	8.5	208.286	0.000
Ingestion of toxic material	10.0	78.5	5.2	11.5	84.8	10.0	281.703	0.000
Falling of a person from height	8.0	68.8	14.3	25.5	77.7	5.7	178.571	0.000
Person with bleeding	10.0	60.0	17.2	25.7	72.8	14.3	151.143	0.000
Exposure to fire accident	8.0	57.2	20	22.7	72.00	20.1	126.000	0.000

**Table (9): Distribution of 3 Workplace According to Checklist (OHSAS Checklist Parameters)**

Item	A	B	C	total	Present %
Good ventilation	1	1	1	3/3	100
Sufficient light	1	1	1	3/3	100
Enough space between machines	0	0	0	0/3	0
Fire extinguisher	1	1	1	3/3	100
Ambulance car	1	1	1	3/3	100
Medical clinic inside facility	1	1	1	3/3	100
Periodic medical examination	0	0	0	0/3	0
Pre employment examination	1	1	1	3/3	100
Presence PPE	1	1	1	3/3	100
Enough PPE	0	1	1	2/3	66.7
Training on use of PPE	0	1	1	2/3	66.7
Periodic checking of PPE	0	0	0	0/3	0
Punishments for those not using PPE	1	1	1	3/3	100
Leisure time journeys or activates	1	1	1	3/3	100
Periodic workers training on occupational safety	0	0	0	0/3	0
Emergency plan in cases of emergency	1	1	1	3/3	100
Application of emergency plan on real ground	1	1	1	3/3	100
Explanation of change of policy to workers	1	1	1	3/3	100
Presence of specific employees to identify occupational risks	1	1	1	3/3	100
Procedures factory follow after recognition of danger	1	1	1	3/3	100
The workers know these procedures	0	0	0	0/3	0
Presence of internal auditors to check safety	1	1	1	3/3	100
Role of internal auditors is played	0	0	0	0/3	0
Part time during working day	1	1	1	3/3	100
Presence of medical records for each worker	1	1	1	3/3	100
Computerized of medical records	0	0	0	0/3	0

A= Concrete plant building B=roods and reuse recycle C= dispose of construction hazards



**Figure (2) Relation between workers' years of experience, and knowledge, attitude and practice**

In addition, more than one third of the studied sample was exposed to eye problems due to chemical hazard and there were highly statistically significant differences regarding to the risks of exposure to health problems and accidents. This is consistent with **Rantanen, (2004)**, who reported that still 20% - 30% of the workers in the industrialized countries, and up to 50% of the working people in developing countries are exposed to the traditional physical, chemical, ergonomic and safety hazards. On the contrary, **Bazroy, et al., (2003)**, found that in the work site, the

majority of the workers are exposed to fractures in cement mill and concrete. According to **Beach, (2009)**, age actually had stronger effect upon accident rate than did time on the job. The United States Department of Health and Human Services(**USDHHS, 2000**), reported that workers having years of experience more than 10 years were more exposed to hearing loss, eye problems, high blood pressure, respiratory damage resulting from dust, thermal stress from high temperature and occupational traumatic injuries including amputations, fractures, lacerations and death.

The results of this study showed that, almost two thirds of chronic complaints were musculoskeletal disorders followed by skin disorders, sinusitis, hypertension, hearing disorders, diabetes and bronchitis and chronic cough. However, minorities of the studied sample complained from liver disease and silicosis. These findings are supported by the results of **Zuskin, et al., (2007)**, who reported that cement had a significantly higher prevalence of chronic cough, chronic bronchitis, hearing disorders and chronic sinusitis than control workers.

Regarding to workers' complaints, results revealed that more than two thirds of the studied workers complained from musculoskeletal disorders, may be explained by their frequent exposure to ergonomic risk factors such as repetition movement, static postures and quick motions. This is also congruent with the results of **Brisson, et al., (2009)**, who identified that, impairments to musculoskeletal system are estimated to affect more than 24 million persons, the work place is estimated to account for more than 20% of all back sprains and injuries. Back injuries are associated with improper handling of materials and repetitive motion. There were statistically significant relations regarding to first aid providers and place of treatments.

Regarding to the past history of occupational injuries during 2009, results revealed that the studied sample suffered from work injuries, and around that one quarter of workers complain the injuries resulted from trauma, fractures and wounds. For less than one quarter of first aid was provided by the colleagues and for more than three quarters by the physicians. Regarding the place of treatment for almost two thirds, it was in the factory clinic and for only, less than one fifth in the injury site. Regarding to injury outcome, more than one quarter of reported record had temporary disability. On the contrary, **Tay, (2009)**, who carried out a retrospective study to elicit the profile of workers who suffered from work injuries, trauma, fractures and wounds were notified to the Department of Industrial Health.

Concerning workers wearing PPE, the researchers observed that almost two thirds of the studied workers were not wearing safety measures. This finding may be explained by the lack of training and insufficient safety measures in the factory which improved after the health promotion program. There were highly statistically significant differences ( $P < 0.001$ ) between pre and post program implementation. This supports the results of **Bazroy, et al., (2003)**, who found that less than half of the workers were not using PPE which improved to less than two thirds after the training program of workers. Regarding types of PPE the workers are wearing, the researchers observed that, more than third of studied sample were wearing aprons, more than quarter were wearing goggles, more

than tenth wearing safety gloves. Concerning availability of PPE high percentage of the studied sample accounting for more than three quarters reported that the PPE were not enough in their work area, while it increased to be available representing the majority post program. On the contrary **Akbar-Khanzadeh, et al., (2005)** found that the workers were wearing safety measures with comfort in average range ; 52% aprons, 51% safety glasses, 42% rubber gloves, and 36% hearing protectors.

The finding of the current study showed that only more than one tenth of the studied workers wearing safety gloves pre intervention which is incongruent with the results of **Tarvsainen, et al., (2006)** who found that 94% of the studied workers used protective gloves.

The present pre test result revealed that a minority of the studied workers wear earring muff which disagreed with the results of **Moore, (2007)**, who carried out a survey of 998 noisy factories in New Zealand and showed that 43% of the workers actually wore the hearing protectors provided.

Concerning workers' knowledge, relatively high percentages of the studied workers had correct answer as moderate knowledge about types of PPE, types of occupational diseases and had moderate knowledge about the correct practices in case of exposure to fire accidents, entry of flying dust in the eye, contact between chemical materials and skin. However, workers knowledge improved after implementation the program. These results were incongruent with **Ryan and Lawer, (2004)**, who clarified that the knowledge about first aid and medical emergencies can literally mean the difference between life and death and can help in prevention of disability or injury, and first aid skills will increase workers confidence in dealing with both minor and major emergency and will be reassuring the injured person. Regarding to workers attitude, the majority of the studied workers had positive attitude about different aspects of occupational safety and work related hazards. This is inconsistent with **Durocher, (2007)**, who found that the majority of workers had poor knowledge and negative attitude about the preventive measures.

The present study result showed that the factory did not give periodic training to workers about the occupational safety which is contradicting with **Levy and Wegman, (2000)**, who stressed that the education and advice concerning specific work hazards are essential.

Concerning the availability of PPE in the current study, results revealed that, in spite of its presence it is not enough, and that there was lack of in service training performed on its use as well as no periodic checking about it which may be explained by the lack of administrative follow up for specialized employees responsible from this role. On the contrary, **Levy &**

**Wegman, (2000)**, reported that the occupational safety and health administration (OSHA) and other authorities have emphasized the importance of developing a complete program for PPE.

The present study showed that ventilation, light, and periodic medical examination inside the factories were not available which may be explained by lack of safe working environment and no application the Occupational Health and Safety Assessment Series (OHSAS). In this respect, **Levy & Wegman, (2000)**, reported that the good lighting enhances the ability of workers to perceive and react to these hazards. As well, **Rosenstock, et al., (2005)**, mentioned that the ventilation is a central component of hazard.

#### Conclusion:

According to the findings and research hypothesis health promotion program will improve the workers knowledge, attitude and practices regarding safety measures This was obvious In table 5,6,7 that showed statistical significant improvement before a and after implementation of the health promotion program regarding knowledge, attitude and practice .

#### Recommendations:

The study recommended that:

1. Apply the international standard(OHSAS,2008) in the field work to improve occupational health and safety performance for workers safety.
2. Periodic checkup of health status for workers early detection of occupational hazards to monitor their health status and early case finding.
3. Periodic educational training and workshop for all workers to use personal protective equipment .and first aid, promotion of personal fitness of the workers by health promotion programs.

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