

Structured Teaching Program on Occupational Health Hazards among Painting Workers at Elherafeyien City in Cairo

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Abstract: Background: Exposure to hazardous chemicals of paints in developing countries is common. The consequences of not following safety practice guidelines can be fatal. **Aim:** This study aim to evaluate the structured teaching program on occupational health hazards among painting workers in El-Herafeyien City. **Research design:** a quasi-experimental study used in this study. **Sample:** A purposive sample of 60 spray-painting workers. **Tools** used in this study were demographic characteristics; assessment of occupational health problems; knowledge of spray painting workers regarding occupational hazards and safety and observation checklist to assess use of personal protective devices among workers. **Results:** it showed that 75% of workers had multiple symptoms, 51.6% had respiratory problems. Workers had unsatisfactory knowledge and practice pre structured teaching program while majority of them had satisfactory knowledge and practice post structured teaching program. It revealed that highly significant correlation among job duration, multiple symptoms and bronchial asthma ($p > 0.000$), it showed that highly significant correlation among smoking, bronchial asthma and productive cough. **Conclusion:** the structured teaching program improves the knowledge and practice of workers regarding occupational hazards. **Recommendations:** it suggested continuous in-service training to spray-painters about the importance of protection and practice of safety measures.

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Keywords: Structured Teaching Program; Occupational Health Hazards; Practice of Safety Measures; painting Workers; Elherafeyien City

1.1 Introduction

Work plays a central role in people's lives whereas the working population represents half of the world's population, are being the main contributors to socioeconomic development; their health is determined not only by the work place but also by social, individual factor as well as access to available health services. Any industry plays an important role in building up of a nation. Most workers spend at least 8 hours a day in the work place which have a strong effect on their health and safety due to work and work-related injuries (Joseph et al, 2016).

An occupational hazard is something unpleasant, the risk, harm, or danger that an individual is exposed to at the workplace, whereas occupational diseases result from such exposures to the individual. The main reasons were low levels of education of workers, inadequate knowledge of health hazards and unavailability of preventive measures. Globalization and rapid industrial growth in the past few years have added further complex issues relating to occupational health (Joseph et al, 2016).

Worldwide, there are 2.9 billion workers who are exposed to hazardous risks at their work places. The number of occupational accidents and diseases are increasing in developing countries. It has been estimated that over 120 million occupational accidents

with over 200,000 mortalities occur each year in these countries (Tadesse et al, 2016). During work periods, workers are faced with a variety of hazards almost as numerous as the different types of work, including chemicals, biological agents, physical factors, and adverse ergonomic conditions. These are responsible for a variety of health consequences (Awodele et al, 2014).

Basically paints are a mixture of pigments, solvents and other additives to enhance the practices of paint, like dryers and hardeners. Pigments and additives in paint do not dissolve completely but rather remain suspended throughout the systems to form emulsions and other paint mixtures. As most substances in paints are toxic to humans they are a health hazard to the users. The paint being a mixture of solvents, pigment and other additives, the spraying activities create paint mists that spread the volatile matters to the surrounding air (Mwatu, 2011).

Many paints are classified as hazardous substances because they contain potentially harmful ingredients exposure to which may cause injury and illness through inhalation of toxic vapors and mists, or absorption of irritants through the skin. Other hazardous substances that spray painting workers could be exposed to include thinners, resins, degreasers, surface preparation products, dusts from

sanding, rust converters and rust removers. Outcomes associated with exposure to these organic compounds in oil based paints and coatings by construction and maintenance painters include increased rates of lung, throat and larynx cancer, leukemia, impaired nervous system function, kidney and liver disease, diseases of the blood or blood forming organs; and birth defects among offspring (Onesmo and Rongo, 2018).

Some chemicals (organic and inorganic) used in paint industries contain heavy metals with known risks. However the introduction of water-based paints has not eliminated the problem. According to the research done in UK they concluded that, water-based paints now frequently used for house painting still contain small amounts of volatile organic compounds (VOCs), with the potential to exacerbate symptoms of asthma (Awodele et al, 2014).

Painters become exposed to poisonous materials and flammable or explosive sprays, particulates and vapors or absorption of irritants through the skin (Mwatu, 2011). The use of flammable substances in paint spraying increases the fire and explosion hazards. In paint spraying, the paint mists spread and rapidly fill the airspace, and when they come into contact with potential sources of ignition, such as static electricity, sparks and flames, fire or explosion can occur (Occupational Safety and Health Branch Labour Department, 2003).

To control these medical hazards, particularly in relation to heavy metals, there are coordinated safety initiatives introduced to limit heavy metal exposures in the paint industry thereby preventing negative health effects. These measures include redesigning processes to place a barrier between workers and the hazard; adopting standard operating procedures or safe work practices; providing appropriate training, instruction, or information to reduce the potential for harm and/or adverse health effects to person (s); and implementing the use of personal protective devices (PPDs) such as gloves, glasses, aprons, safety footwear, and dust masks designed to reduce exposure to the hazard. PPDs are usually the last line of defense and usually used in conjunction with one or more of the other control measures (Health and Safety Authority, 2011).

Occupational health is concerned with health in its relation to work and the working environment. Occupational health implies not only health protection but also health promotion, emergency care, wide range of preventive, curative services, rehabilitative services, a concept which includes everything that can apply to promote the health and working capacity of worker (Buyite & Rodrigues, 2016).

Globally, protection of workers against work-related injuries and illnesses has over the years been an issue of great concern to workers, employees, governments, and the overall community. This is

because a safe working environment does not only promote the physical, mental and social well-being of workers, but also saves cost related to medical bills, compensation, work interruption, loss of experienced personnel, and others resulting from accidents at the workplace (Monney et al, 2014).

1.2 Significance of the Study:

Exposure to hazardous chemicals of paints in developing countries is common. Spray painters in small scale auto garages are exposed to paint mists, mainly due to their open space work set up and lack of personal protective clothing (Mwatu, 2011). Painting is an informal sector and informal workers work under this sector. These informal workers work under circumstances where occupational health and safety protection is almost non-existent (Singh et al, 2012).

Mishandling of paints and inhalation of paint materials become a problem as this paints contain chemicals which are dangerous upon inhalation. Painters are exposed to numerous hazards with consequent threat to health including respiratory disorders. Different chemicals used in spray painting have revealed to cause serious respiratory problems to painters. Inhalation of mists and vapors can be dangerous to health depending upon the agent's toxic characteristics and the amount and manner of exposure. Other hazardous substances that spray painting workers could be exposed to include thinners, resins, degreasers, surface preparation products, dusts from sanding, rust converters and rust removers (Onesmo and Rongo, 2018).

Recent study conducted on paint workers in Assiut governorate, Egypt showed evidence that paint workers were exposed to occupational health hazards especially among chronic exposure to paints. Paint workers should use protective devices as gloves and masks during their routine work (Maksoud et al, 2018). So the consequences of not following these practice guidelines can be fatal as control of these hazards is the key to reducing the risk of injury and illness among workers in this industry (Awodele et al, 2014).

Workplace health programs have been discussed repeatedly in recent years as a means to protect health and increase productivity among workers. Numerous workplace health programs have been shown to offer benefits such as decreased sickness absence, reduced medical costs, enhanced productivity, produced happier, healthier and more loyal employees and reduced disease prevalence (Eng et al, 2016).

Occupational health nursing is concerned with the nursing component of comprehensive occupational health care and contributes health promotion, protection of the health of disabled workers. The nurses dealing with occupational health can play a

major role in promotion, protection, prevention and control of diseases and disabilities (Roy, 2013).

2.1 Aim of the study:

Aim of the study:

This study was evaluated the structured teaching program on occupational health hazards among painting workers in El-Herafeyien City, Cairo through:

- Assessing occupational health problems among spray painting workers.
- Assessing the knowledge and practices of workers about occupational health hazards among spray painting workers.
- Designing and implementing structured teaching program according to their needs.
- Evaluating the improvement of knowledge and safety practices among spray painting workers after structured teaching program.

2.2 Hypothesis of the study:

In order to accomplish the research aim of this study the following hypotheses was suggested: structured teaching program would improve knowledge and safety practices of spray painting workers regarding occupational hazards and safety.

3.1 Research Design; the present study is a quasi-experimental study design.

3.2 Setting; this study was carried out at 50% of Painting workshops at El-herafeyien City which is located in El-slam district in Cairo which represent 15 Painting workshops from the total number of 31 Painting workshops. The services areas of which varies from 12-30 square meters, all the workshops are not officially authorized, and badly ventilated. It is an area inhabited mainly by low income people most of who rely on informal workers/employment, including garages for motor vehicle, mechanical repairs and spray painting work.

3.3 Sample: a purposive sampling used in this study, 60 workers were directly involved in spray painting activities according to **inclusion Criteria** whereas all spray painters in the painting workshops area, who were directly involved in spray painting activities and willing to fill in a questionnaire and/or be interviewed, were included in the study.

3.4 Tools of data collection; the first tool was structured interview questionnaire used to collect data related to this study; it was written in a simple Arabic language developed by researchers. **The first part** was concerned with demographic characteristics of studied spray painters such as; age, education, job duration, marital status, smoker and exposure to paint spray. **The second part** included assessment of occupational health problems associated with exposure to auto spray painting as; dry cough, productive cough, bronchial asthma, skin irritation....etc. **The third part:** it consisted of 30 items (true/false and multiple questions items) knowledge of spray painting

workers regarding occupational hazards and its prevention which include knowledge of physical hazards, chemical hazards, personal protective equipment, hand hygiene, first aid, fire safety and health seeking behavior. **The second tool:** it consisted of 15 items included a observation checklist for assessing use of personal protective devices and safety practices among spray painting workers. The observation checklist included items such as the use of suitable gloves, dust mask, safety shoes, apron, and goggles or protective face shields. Also it included practices of hand hygiene, availability of eye washers, fire safety, first aid (wound, burn, hemorrhage, fractures...etc.), using of warning signs on products and good ventilation. Answers for this checklist were "use" and "not use".

3.5 Scoring system:

The knowledge score one was given for each correct answer and zero for incorrect answer. For each area of knowledge, the scores of the questions were summed-up and the total score divided by the number of the items. These scores were converted into a percent score. The total workers' knowledge was considered satisfactory if the percent score was 60% or more and unsatisfactory if less than 60%.

The practice score one was given for each use and zero for don't use. For each item of practices, the scores of the questions were summed-up and the total score divided by the number of the items. These scores were converted into a percent score. The total workers' practices were considered satisfactory if the percent score was 60% or more and unsatisfactory if less than 60%.

3.6 Validity and reliability:

The tools were tested for their content validity by a jury of five experts in the community health nursing. The required modifications were carried out accordingly. Testing reliability of the study tools was done by Cronbach alpha, the result was 0.78 for questionnaire, 0.69 for observation checklist, 0.74 for PSI and 0.80 for CHIP.

3.7 Pilot Study

A pilot study was conducted on 10% of spray painters to test the clarity of questions and to estimate the time required for using the tools. No modification was done to the tools; accordingly spray painters' who shared in the pilot study were included in the study sample.

3.8 Field Work:

Permission was obtained from Elherafeyien district affiliated to health affairs of Elsalam department prior to data collection. Data collection was done pre and post structured teaching program implementation. Data were collected and program was implemented over a period of 7 months, 2 days/week and 4 hours/day starting from May 2016 to December

2016. Researchers designed the training materials to teach a practical approach to best workplace practices. A Power Point presentation was developed to convey this information, with pictures and graphics to accommodate visual as well as verbal learners, with educational objectives clearly written on the slides. Workers were given a handout containing all of these slides for future reference.

The Structured Teaching Program conducted through four consecutive phases: assessment, planning, implementation and evaluation.

I-Assessment phase:

The tools of data collection were developed into Arabic language by the researchers after thorough detailed review of literature. The researchers started with a pilot test, and then validated the tool through the opinions of experts in nursing. Then the researchers attended the workshop of spray painters 2 days/week from 10 am to 2 pm for data collection to identify their knowledge and practices regarding occupational health hazards and its prevention. Each worker was individually interviewed to complete data collection (pretest/assessment phase).

II-Planning phase

Based on the assessment phase, the program content and media (in the form of the program and implementation of teaching instructions) were prepared. The health instructions were developed on the basis of the results of the assessment phase and reviewing the relevant literature in Arabic language.

Program objectives: the Structured Teaching Program aims to enhance knowledge and practice regarding occupation hazards among spray painting workers.

Contents: The content of the health instructions selected and the health instructions were planned and developed according to careful study of spray painting educational needs revealed from the assessment phase, and reviewing the relevant literature. It includes general concepts about occupational health hazards (physical, chemical, psychosocial and ergonomic hazards), safety practices regarding spray painting, use of personal protective equipment (Hand gloves, Goggles, Safety boots, Dust masks, Aprons), hand hygiene and eye washing, principles of first aid (wound, burn, hemorrhage, fractures...etc.), fire safety, using warning signs on products, importance of good ventilation and foundations of preventing work accidents.

Teaching methods: were selected to suit teaching small groups' learners in the form of lectures, group discussion, demonstration, and re-demonstration. Teaching materials were prepared as booklet, brochures and colored posters that covered theoretical and practical information. Researchers designed the

training materials to teach a practical approach to best workplace practices.

III-Implementation phase

Implementation of the teaching program conducted with the spray painters after explanation of the purpose of the study and their acceptance of participation. The teaching program was implemented through five sessions, and was given in small groups; each group consisted of five to seven participants. A PowerPoint presentation was developed to convey this information, with pictures and graphics to accommodate visual as well as verbal learners, with educational objectives clearly written on the slides. Trainees were given a handout containing all of these slides for future reference. The health instructions have been implemented through five sessions. The length of each session ranged about 35-45 minutes. Workers divided into small groups; each group consisted of five to seven participants. Individual sessions, group discussions, demonstrations and re-demonstrations used as teaching methods. Audio-visual aids as video clips, role-plays, brochures and introduction of a booklet were used to facilitate the process of educational program to serve the purposes for which it designed.

IV-Evaluation phase

The evaluation phase emphasized on estimating the effect of the teaching program on workers' knowledge and practice regarding occupational health hazards and safety measures, after implementation of the teaching program, the studied workers were individually re-interviewed after one week to assess their knowledge and practices (posttest).

3.9 Ethical considerations

Study participants were interviewed after informed written consent was obtained. They were also informed that their participation was voluntary and that they could withdraw from the interview at any time without consequences. The participants were assured that their responses would be treated confidentially through the use of strict coding measures.

3.10 Data analysis

Data collected were entered, edited and coded in a Microsoft excel sheet. The data were then exported to SPSS (Statistical Package for the Social Sciences), Version 16. All comparisons were two tailed and p-values <0.05 were considered significant. Descriptive statistics for the various variables, such as frequencies and percentages were used to describe the sample. To compare variables between the pre and post teaching program, chi-squared test (for qualitative variables) were used.

4. Results

Table 1 shows that 60% of the painting workers ages were from 30 to 40 years. All of them 100% of them were males, while 33.2 % and 36.6% of them had a Technical and basic level of education respectively. Regarding the job duration it was

obvious that 46.6% of them the job duration were 5 to 8 years. Regarding marital status it showed that 53.3% of the workers were married and 80% of them were smokers. All participants 100% were exposed to paint spray.

Table 1: Distribution of Workers Regarding Personal Characteristics.

Items	Workers (n=60)	
	No.	%
Age (years)		
20-	2	3.3
30 -	36	60
40-	12	20
50-	10	16.7
Gender		
Male	60	100
Education		
Illiterate	12	20
Read/write	6	10
Basic	22	36.6
Technical	16	26.6
Secondary	4	6.6
Job duration		
3-5	12	20
5-8	28	46.6
> 8	20	33.3
Marital status		
Single	28	46.7
Married	32	53.3
Smoker	48	80
Exposure to paint spray	60	100

Table 2: Distribution of Self-reported occupational health problems among workers

Items	Workers (n=60)	
	No.	%
Multiple symptoms	45	75
Headache	9	15
Dizziness	6	10
Bronchial asthma	12	20
Skin irritation	9	15
Itching	8	13.3
Weight loss	3	5
Fatigue	12	20
Eye irritation	8	13.3
Chest pain	2	3.3
Dry Cough	6	10
Productive Cough	13	21.6

N.B. Items not mutually exclusive

Regarding occupational health problems among painting workers Table 2 illustrates that 75% of them were suffered from multiple symptoms, 51.6 % was

suffered from respiratory problems (dry cough, productive cough and bronchial asthma) and 20% had fatigue.

According to research hypothesis (table 3, Figure 1, Table 4 Table 4, Figure 2, Table 5, and table 6)

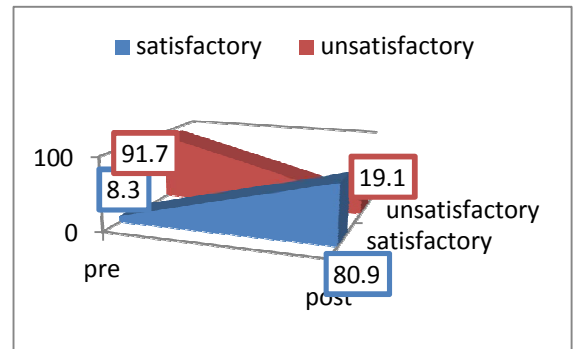
Table (3) illustrates that 93.3%, 86.7%, 90%, and 96.7% of workers had incorrect knowledge pre structured teaching program regarding physical, chemical, psychosocial and ergonomic hazards. In addition it shows that improvement in the knowledge of workers post structured teaching program phase regarding occupational hazards with highly statistically significant differences between pre and post teaching program phase ($p > 0.000$).

Regarding total knowledge of occupational hazards among workers pre and post structured teaching program figure 1 reveals that workers had unsatisfactory knowledge pre structured teaching program whereas 91.7% of them had unsatisfactory knowledge while 80.9% of them had satisfactory knowledge post structured teaching program.

Table 3: statistical difference between pre and post structured teaching program of knowledge regarding occupational hazards among workers

Items	Workers (n=60)				X ²	P value
	Pre		Post			
	No.	%	No.	%		
Physical Hazards						
Correct	4	6.7	49	81.7	68.431	0.000
Incorrect	56	93.3	11	18.3		
Chemical Hazards						
Correct	8	13.3	53	88.3	67.519	0.000
Incorrect	52	6.7	7	1.7		
Psychosocial Hazards						
Correct	6	10.0	51	85.0	67.669	0.000
Incorrect	54	90.0	9	15.0		
Ergonomic Hazards						
Correct	2	3.3	42	70.0	57.416	0.000
Incorrect	58	96.7	18	30.0		

Table (4) illustrates that 63.3%, 60% and 65 % of workers had incorrect knowledge pre structured teaching program regarding personal protective equipment, hand hygiene, and health seeking behavior. Regarding first aid knowledge and fire safety it shows that 90% and 80% of them had incorrect knowledge pre structured teaching program. In addition it shows that improvement in the knowledge of workers post structured teaching program phase regarding prevention and control of occupational health hazards with highly statistically significant differences between pre and post structured teaching program phase ($p>0.000$).

**Figure 1:** Total Percentage Distribution of knowledge regarding occupational hazards among workers pre and post structured teaching program**Table 4:** statistical difference between pre and post structured teaching program of knowledge regarding prevention and control of occupational health hazards among workers

Items	Workers (n=60)				X ²	P value
	Pre		Post			
	No.	%	No.	%		
Personal protective equipment						
Correct	22	36.7	57	95	45.384	0.000
Incorrect	38	63.3	3	5		
Hand hygiene						
Correct	24	40	60	100	51.429	0.000
Incorrect	36	60	0	0.0		
First aid						
Correct	6	10	43	71.7	47.220	0.000
Incorrect	54	90	17	28.3		
Fire safety						
Correct	12	20	41	68.3	28.420	0.000
Incorrect	48	80	19	31.7		
Health seeking behaviour						
Correct	21	35	49	81.7	26.880	0.000
Incorrect	39	65	11	18.3		

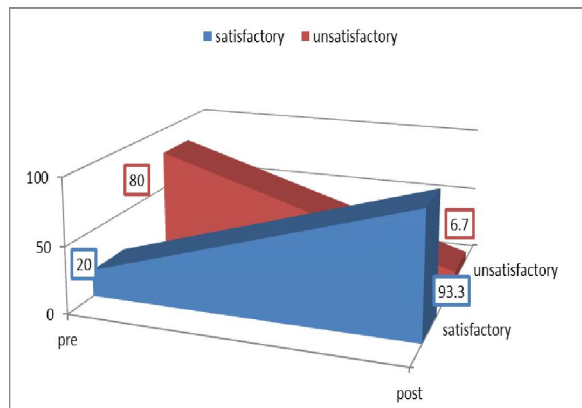


Figure 2: Percentage Distribution of practices regarding Prevention and control of occupational health hazards among workers pre and post structured teaching program

Regarding total knowledge of Prevention and control of occupational health hazards among workers

pre and post structured teaching program figure 1 reveals that workers had unsatisfactory knowledge pre structured teaching program whereas the 80% of them had unsatisfactory knowledge while 93.3% of them had satisfactory knowledge post structured teaching program.

Regarding use of personal protective devices among workers pre and post structured teaching program table 5 explains that the majority of the workers did not use personal protective equipment pre structured teaching program whereas 88.3%, 95%, 93.3%, 100% and 90 % respectively did not use hand gloves, goggles, safety boots, dust masks and aprons. While 65%, 56.7%, 66.7%, 53.3% and 70% of them comply with use of hand gloves, goggles, safety boots, dust masks and aprons respectively post structured teaching program with highly significant differences between pre and post structured teaching program ($p > 0.000$).

Table 5: statistical difference between pre and post structured teaching program of Use of personal protective devices among workers

Items	Workers (n=60)				X ²	P value
	Pre		Post			
	No.	%	No.	%		
Hand gloves						
Use	7	11.7	39	65	36.099	0.000
Don't use	53	88.3	21	35		
Goggles						
Use	3	5	34	56.7	37.551	0.000
Don't use	57	95	26	43.3		
Safety boots						
Use	4	6.7	40	66.7	46.507	0.000
Don't use	56	93.3	20	33.3		
Dust masks						
Use	0	0	32	53.3	43.636	0.000
Don't use	60	100	28	46.7		
Aprons						
Use	6	10	42	70	45.0	0.000
Don't use	54	90	18	30		

Regarding use of safety practice among workers pre and post structured teaching program table 6 explains that 58.3%, 45% and 51.7% of the workers did not comply with hand hygiene, availability of eye washers and good ventilation pre structured teaching program respectively. While post structured teaching program 96.7%, 90%, and 93.3% of them respectively did not comply with fire safety, first aid and using of warning signs on products. While all of them 100% comply with hand hygiene and availability of eye washers, also 93.3%, 78.3%, 80%, and 96.7% of them

comply with fire safety, first aid, using of warning signs on products and good ventilation respectively with highly significant differences between pre and post structured teaching program ($p > 0.000$).

Table 7 showed that highly significant correlation among job duration, multiple symptoms and bronchial asthma ($p > 0.000$). Additionally it showed that highly significant correlation among smoking, bronchial asthma and productive cough P (0.006 and 0.002).

Table 6: statistical difference between pre and post structured teaching program of safety practice among workers

Items	Workers (n=60)				X ²	P value
	Pre		Post			
	No.	%	No.	%		
Hand hygiene						
Use	35	58.3	60	100	31.579	0.000
Don't use	25	41.7	0	0		
Availability of eye washers						
Use	27	45	60	100	45.517	0.000
Don't use	33	55	0	0		
Fire safety						
Use	2	3.3	56	93.3	97.308	0.000
Don't use	58	96.7	4	6.7		
First aid						
Use	6	10	47	78.3	56.807	0.000
Don't use	54	90	13	21.7		
Using of warning signs on products						
Use	4	6.7	48	80	65.701	0.000
Don't use	56	93.3	12	20		
Good ventilation						
Use	31	51.7	58	96.7	31.707	0.000
Don't use	29	48.3	2	3.3		

Table 7: Correlation between job duration and Self-reported occupational health problems among workers

Items		Job duration	Smoking
Multiple symptoms	R	0.783**	0.289*
	P value	0.000	0.025
Bronchial asthma	R	0.650**	0.354**
	P value	0.000	0.006
Productive Cough	R	0.172	0.388**
	P value	0.190	0.002
Skin problems	R	0.248	0.162
	P value	0.056	0.217

4.1 Discussion

Education in occupational safety and health (OSH) is needed urgently in developing countries. Workers' health should be integrated in basic training for health care. It is regarded as a workers' right in all countries to be well informed, educated, and trained in safety and health at work (van Dijk et al, 2015).

Proper hazard recognition and management is essential to improving worker safety practices. When hazards remain unrecognized and unmanaged, the likelihood of accidents and injuries dramatically increases. To improve hazard recognition and safety practices, employers adopt a wide variety of safety training programs. For example, safety education is provided to promote the proper use of personal protective equipment (PPE) and to encourage the implementation of effective injury prevention strategies. Not surprisingly, hundreds of research articles emphasize the importance of safety education, and many others have established causal relationships

between safety training and safety practices (Namian et al, 2016).

The study finding showed that less than two thirds of the painting workers ages were from 30 to less than 40 years and all of them were males. More than one quartet of them had a Technical education, less than half of them the job duration were ranged between five to eight years. More than half of the workers were married and the majority of them were smokers. A study on knowledge of occupational chemical hazards, among spray painting industry done in Ghana by Adei et al (2011) revealed that nearly three quarters were male sprayers between 26-40 years. Additionally Tadesse et al (2016) who conducted a study on awareness of occupational hazards among welders in Ethiopia showed that half of them were married, had secondary education and smokers.

The current study showed that all participants were exposed to paint spray. Spraying solvents

commonly used by respondents included; thinners, lacquer, hardener and automobile paints. These solvents and paints contain hazardous chemicals such as Toluene, Xylene, hexane and methanol; these are all volatile and therefore pose a considerable risk of exposure via inhalation and skin contact during the mixing, filling and spraying. These findings were in congruence with De Oliveira et al (2011) Paint manufacture workers in Brazil are potentially exposed to the chemicals found in paint products although the patterns and levels of exposure to individual agents may differ from those of painters. Paint industry workers are exposed to complex mixtures of organic solvents, heavy metals such as lead, zinc, chromium, cadmium, and many other compounds with potential mutagenic properties, such as phthalic acid and chlorophenols.

Regarding occupational health problems among painting workers the findings illustrated that three quarters of them were suffered from multiple symptoms. More than one third was suffered from respiratory problems and one fifth had chronic fatigue. This finding was similar to Onesmo and Rongo (2018) in Tanzania who concluded that house painters are in danger of compromising their health while struggling for survival by doing painting activities. Exposure of these workers to painting materials cannot be prevented in painters unless training to them about the health hazards of these painting materials is conducted and increase awareness of the effects of this painting materials. Different painters have been affected due to exposure to paints especially through inhalation of vapor and mists. As such respiratory symptoms are characterized by shortness of breath, chest pain, wheezing, and coughing associated with sputum production as their primary symptoms.

In the United Kingdom spray painting was revealed to produce the highest exposure and was one of the leading causes of occupational asthma and sprayers had an 80 fold higher risk of getting asthma compared to the rest of the working population (Richard, 2006). Another study shows that most of self-reported occupational health problems, particularly respiratory related problems (Adei et al 2011).

Additionally a study done by Mwatu (2011) Kenya confirmed the presence, and association between spray painting activities and, asthmatic symptoms, bronchitis symptoms, eye problems and dermatitis. Most of spray painters suffering from different disease symptoms and health hazards associated with spray painting occupation.

In the current study majority of workers had unsatisfactory knowledge pre teaching program regarding occupational hazards, prevention and control which improved post intervention phase with

highly statistically significant differences that is in agreement with Navidian et al (2015) in Iran who revealed that motivational group interviewing based safety education in glass manufacturing enhancing the safety awareness level of workers.

Similarly Patil et al (2016) in India proved that the planned teaching program regarding prevention and control on occupational health hazards in jiggery factory is effective in improving the knowledge of workers working in jiggery factory. This result is opposite with the findings of a study conducted by Tadesse et al (2016) in Ethiopia who found that the majority of participants were aware of occupational hazards that might occur during the welding process. Adewale (2017) in Nigeria added that majority of the respondents have unsatisfactory knowledge of safety practices. Minority of them have good knowledge of hazard control.

Regarding use of personal protective devices among workers pre and post teaching program the findings explained that the majority of the workers did not use personal protective equipment pre intervention. While after implementation of teaching program most of them comply with use of PPE with highly significant differences between pre and post teaching program.

Similarly Onesmo and Rongo (2018) in Tanzania found that workers were aware about the use of protective equipment although the usage rate was very low. Meanwhile Buyite and Rodrigues (2016) proved that majority of workers were using moderately adequate safety measures among construction laborers at selected construction sites of Mangalore.

In Accordance to Tadesse et al (2016) in Ethiopia use of personal protective equipment (PPE) is one of the important measures to safeguard workers from exposure to occupational hazards, especially in developing countries where conventional occupational safety control principles remain a challenge to implement. Factory workers lack the knowledge on proper use of protective measures and are least aware of health effects emanating from the activities and materials in their work environments. Joseph et al (2017) in India concluded that preventive measures concerning functional occupational health and safety programs are essential to safeguarding the health and safety condition of workforce.

Regarding use of safety practice among workers the current study pre teaching program revealed that nearly half of the workers did not comply with hand hygiene, availability of eye washers and good ventilation while majority of them did not comply with fire safety, first aid and using of warning signs on products. While after implementation all of them comply with hand hygiene and availability of eye washers, also the most of them comply with fire safety

and good ventilation, more than three quarters comply with first aid, using of warning signs on products with highly significant differences between pre and post teaching program.

Similarly Monney et al (2014) in Ghana revealed that first aid facilities are non-existent in the vehicle repair shops and majority of the artisans are unfamiliar with administering first aid to injured persons, less than a quarter of the artisans, reportedly, have been trained in fire safety and management. Additionally their findings indicated that the artisans are either unenlightened or unconcerned about the risks associated unsatisfactory hand hygiene in particular.

Accordingly Adei et al, (2011) in Ghana nearly half of the sprayers, practiced their work in the open air and all respondents claimed there was adequate ventilation in working premises. They added that lack of chemical education and enforcement of safety practices in the metropolis is a major contributing factor of the occupational hazard exposure. There is the need for law enforcement and education on occupational chemical hazard exposure in the paint spraying industry to improve occupational health and safety provision. Mandatory training for initial certification and refresher training every two years by the government may be a more effective strategy in reaching a wide range of spray painters.

This finding revealed that highly significant correlation among smoking, bronchial asthma and productive cough, it was in congruence with Onesmo and Rongo (2018) who observed that the prevalence of respiratory symptoms increased with increasing number of cigarettes the workers was smoking per day.

4.2 Conclusion

According to the results and research hypothesis it was concluded that the structured teaching program on occupational health hazards successfully improves the knowledge of workers regarding occupational hazards, prevention and control of occupational health hazards. Additionally; the structured teaching program improves the practices of workers regarding Use of personal protective devices and safety practice.

4.3 Recommendations:

In-service Training should be done to these painters about the importance of material data sheet and use of personal protective equipment. Spray painters should be educated on the importance of health seeking behaviours to protect health from chemical emanating from painting materials.

Further researches should be done to test the effectiveness of the structured program in a randomized clinical trial to confirm the findings.

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