
Effect of educational program on knowledge and practices regarding occupational safety measures among photocopier and printing workers at Assiut University

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Abstract

Photocopiers and printers release several toxic compounds when operating, posing a significant public-health issue since millions of workers worldwide might be affected. **Aim:** To evaluate the effectiveness of educational program on knowledge and practices regarding occupational safety measures. **Subjects and Method:** Quasi-experimental with one group pretest, posttest design was conducted, among 163 workers at central printing press, and all photocopier and printing offices at Assiut University Faculties. Data collected by face-to-face interviewing the photocopier and printing workers using a structured questionnaire. It included two tools. **Tool I: Part One:** personal and occupational data. **Part two:** Assessment of studied workers' knowledge about occupational hazards and subsequent health problems. **Tool II:** Hand washing & back stretching exercise observational checklist. **Results:** The study exposed that 89.6% of studied workers had poor knowledge scores about occupational hazards and safety measures in the pre-test, which improved to 44.2% of workers who had good knowledge scores in the post-test and 58.3% of them had fair knowledge scores in the follow-up test. Additionally, 94.5% of studied workers had unsatisfactory practice scores in the pre-test, which improved to 62.6% having satisfactory practice scores in the post-test and 49.7% having satisfactory practices scores in the follow-up test with a statistically significant $p < 0.001$. **Conclusion:** Implementation of educational program leading to an improvement of workers' knowledge and practices regarding occupational safety measures. **Recommendation:** Continuing educational program for the photocopier and printing workers to reduce occupational hazards.

Keywords: Educational program, Occupational safety, Photocopier, Printing & Workers.

Introduction

Photocopiers, laser printers, and other electronic duplicating machines are increased dramatically at the latest & modern decades; it is a daily duty among millions of people around the world on a daily basis, making them indispensable in industries, university, schools and laboratories. Several employees may be engaged in their operation for large time. Health consequences may occur if machines are improperly sited, inadequately ventilated, improperly maintained, or continuously utilized by operators without personal protective equipment (Nandan, 2020).

Occupational hazards in the workplace threaten a large proportion of the world's population. The influence of occupational exposure on printing workers in underdeveloped countries is greater than in developed countries. This could be due to a absence of training about safety procedures, workload and insufficient safety signs. Printing and photocopier machines emitted a variety of harmful substances, including various gases, ozone, heavy metals, acetone, radiation, temperature, and toner particles (Abd El-Maksoud & Ali, 2020).

The International Labor Organization represents that accidents at workplace kill an estimated 350,000 workers each year (Badoozadeh et al., 2021). Also, printing occupations have been associated with higher rates of death and morbidity from a variety of diseases, including an increased risk of lung, bladder, liver, and kidney cancer (Ibrahim et al., 2019).

Chemical pollutants such as paper dust, ink dust, and organic solvents released by functioning machines are rapidly dispersed throughout a room. The majority of pollutants are emitted during the storage, usage, and disposal of chemicals and liquid/solid waste. Contact with these harmful elements can result in serious health issues. Many studies have been conducted on the health effects of indoor air pollution in the printing press. Respiratory tract inflammation, fibrosis, apoptosis, and an excess of pathogenic germs, are all potential threats to human health especially among those who spend a lot of time in printing offices (Pongboonkhumlarp & Jinsart, 2022).

The printing press industry is one of many that have been linked to an increase in the frequency of occupational lead poisoning. Also, lead poisoning could occur through direct contact with lead plates without any protective devices and normal hand-to-

mouth contact without hand washing. As inhalation, the exposure to airborne lead from various operations in the printing industry can range from chronic to severe lead poisoning. Lead poisoning causes behavioral signs and neurotoxic abnormalities. (Sripathy et al., 2014).

According to a study conducted at South Indian 2017 among 385 workers, it was revealed that 62.5% among studied workers prone to work-related muscle skeletal disorders, the musculoskeletal complaints distributed as the following lower back (75.1%), shoulder (66.2%), knees (58.7%), and ankle/feet (55.6%). According to the study all of these problems referred manual handling, repetitive movement, awkward and static postures, prolonged sitting or standing in the same position (Shankar et al., 2017). Workers play a vital part in protecting themselves from occupational health hazards by using suitable lifting techniques and determining the necessary precaution and control measures. This allows workers with adequate training and physical capabilities to attempt their work activities safely (Othman et al., 2017).

Many strategies can be used to reduce the effects on health while printing, such as appropriate machine maintenance, utilizing high-quality toners in photocopiers, and providing suitable air circulating devices and adequate ventilation, to improve heat dilution in the occupational settings. Also, the worker should be close the photocopy machine lid and work at a 1 meter distance to reduce the heat and temperature exposure additionally; protective precautions should be maintained by the operator when removing jams, toner or ink from the machine. (Nandan, 2020).

Occupational health nurses play an important role in working settings by giving information about preventative precautions to protect the health and safety of workers under various job circumstances, especially among workplace increased the liability to injuries, toxins and machines. Occupational health nurses work to ensure that all workplace health and safety standards are applicable in order to protect employees' health and well-being. They also work to maximize workers' productivity and act as advocator for all employees' rights by ensuring that they benefits with all preventative health and safety measures (Abd El-Maksoud & Ali, 2020).

Significance of the Study

Printing and photocopy workers complain from a variety of health problems, Musculoskeletal disorders (MSDs) continue to be the leading causes of occupational injury in the both industrially developed and developing countries and are the main cause of

work-related disability and lost-time illnesses (Foong et al., 2014).

According to a study conducted at Egypt 2021, the prevalence of musculoskeletal symptoms was 76.5% of the exposed printing workers. Also, the most affected regions were as follows: lower back, knees, neck, hand/wrist and shoulder, respectively (Mourad, 2021). They spend more and more time at awkward-back posture-trunk-bending-forward, at the-waist, with 46 degrees deviation, from neutral-posture; visually-demanding-operation (risk of eye-strain); contact-pressure; stress on lower-extremities; and standing-static-posture making them at higher risk for MSDs (Starovoytova, 2017).

Several studies suggested that forceful and repetitive motions induce high prevalence of injury and work-related MSDs especially back pain, also, occupational chemical exposure resulted in dermatitis. Based on this, preventive ergonomic/chemical interventions should be applied (Mourad, 2021). In order to increase workers' health and safety knowledge, reducing damage and suffering. Furthermore, provide safety and health training programs on managing and improving workability (Beljickangarloo et al., 2023).

Aim of the Study

To evaluate the effectiveness of educational program on knowledge and practices regarding occupational safety measures among photocopy and printing workers at Assiut University.

Research hypothesis

H1: There will be a significant improvement in the photocopy and printing worker's knowledge and practice regarding occupational hazards and safety measures after implementing a training program.

H2: Improvement of photocopies and printing workers practice will be resulted in increase productivity, decreasing back pain level and functional disability.

Subjects and Methods

Research Design:

Quasi-experimental with one group (Pretest-posttest) design was utilized in this study.

Setting:

The study was conducted at the central printing press, all printing and photocopies offices at Assiut University faculties.

Sample:

Convenience sample was used in this study, all workers both males and females included in the current study.

Sample Size:

The sample size was calculated using G power software version 3.1.3, (Faul et al., 2007) using

paired t test for comparing the difference of mean of knowledge level (before and after health education program) with the following parameters, effect size 0.2 (assumed minimum effect size to ensure accuracy), 0.05 alpha error, with (1- beta error prob.) power (1- beta error prob.) 0.80, one tailed.

The recommended sample size was 156 subjects. It was raised to 163 to compensate for non-response.

Tools of the Study

Study tools were developed after reviewing the comprehensive relevant literature. Data was collected through interviewing the photocopy and printing workers using a structured questionnaire. It comprised two main tools:

Tool 1: Contains two parts: **Part one:** Personal and occupational data such as; age, marital status, gender, educational level, working hours/day, years of work experience and performed job tasks. **Part two:** It included 21 questions that assessed the workers' knowledge about definition and objectives of occupational health and safety program (10 grade), importance of personal protective equipment(14 grade) occupational hazards and related health problems including, mechanical (23 grade), chemical (11 grade), physical (22 grade), psychological hazards (11 grade).

The scoring system for knowledge: (91 total scores), each correct answer took one grade and wrong answer or don't know took zero. Total score of knowledge categorized as the following if the score was (from 0-44) < 50% considered poor, if the score was (from 45 to 63) 50% to 70% referred as fair and if the score was (from 64-91) > 70% good (**Fouad, 2019**).

This part was filled three times in pre-test, post-test conducted immediately after implementation of the program and at follow up test after three months.

Tool 2: Involves two parts, **Part one:** Hand washing observational checklist, to assess their practice about hand hygiene, Observational checklist was used for assessing workers' practice of hand washing (**CDC, 2022**). This tool consisted from 5 items each worker trained to perform the procedure (5 grades). **Part two:** Back stretching exercises for preventing/reducing lower back pain; observational checklist was used for applying back stretching exercise (23 grades). This tool consisted from three exercises each worker trained to perform the steps (**William H., 2021**).

Scoring system for practice: It consists of (28) items. One (1) grade was given for each accomplished item, and zero (0) was given for not accomplished. It was classified as (< 16.8), < 60% unsatisfactory practice, (from 16.8 and more) 60% and more than for satisfactory practice, summed up and calculated from

the total practice score 28 grade (**Jubayer et al., 2020**).

Also, this tool was obtained three times in pre-test, immediately after the application of the program (post-test) and at follow up test after 3 months.

Validity:

Validity of the study tools examined by a Panel of five experts from community health nursing at Assiut University who checked the instruments for comprehensiveness, relevance, applicability and clarity modification done based on their recommendations.

Reliability:

A reliability analysis was conducted in order to examine the internal consistency of its questions. The value of Cronbach's alpha was 0.859 for knowledge. 0.783 for practice.

Methods of data collection:

Assessment phase

Administrative phase :

An official approval letter was obtained from the Dean of the Faculty of Nursing, Assiut University to the University's president. An oral consent was obtained from all workers included in the study after explanation of the study aims.

A pilot Study:

Pilot study was carried out before starting of data collection on (10%) 17 workers, to test the data collection tools in terms of clarity and comprehension. The pilot study results showed that there is no need for modifications. Therefore these workers were included in the study.

Field of Work

Data was collected from the first of January to the first of July 2022, two days weekly, from 9Am- 1Pm for each day. The study purpose was clarified to photocopy and printing workers to get their cooperation before beginning data collecting.

Pre-test phase:

Pre-test conducted before beginning the implementation of the program after clarification the purpose of the study, to assess studied workers' knowledge and practices regarding occupational hazards and safety measures. An interview questionnaire sheet was used to determine their knowledge about occupational hazards prevailing in their workplace, and its related health problems. Also, an observational checklist was utilized by the researcher to assess the study participants' practices in the pre-test. Researcher was observed studied workers when they were applying hand-washing steps and back-stretching exercises. The researcher began collecting data. The period of collecting data began from the first of January to the first of July 2022, two days weekly. The average time spent for interviewing each worker was 30-35 minutes.

Planning phase:

The sessions and time of the program decided. Other facilities were checked and arranged during this phase as the teaching place, teaching methods as (Discussion, lecture, and Presentation) audiovisual aids and handout with all educational information provided to each worker.

Teaching Time: By the coordination between the researcher and the head of the printing press. The time of teaching was decided.

Teaching place: The program was conducted at the central printing press, photocopy and printing offices at each faculty –Assiut University.

Teaching methods and materials: Proper simple teaching methods were prepared before implementing the educational program; as demonstration, lecture, discussion, and used media as picture, handouts, and posters.

Implementation phase:

After complete of the pretest phase. This phase began and included the implementation of the program it takes about 5 weeks; two days per week. The program content was developed after extensive reviewing the related literature and available relevant resources to enhance studied workers' knowledge and practices about occupational hazards and training on safety measures for protecting themselves while performing their work (especially ergonomic & chemical hazards). The study participants were divided into twenty group, with a range from (8-9) workers for each group, usually two groups per day. Each group had three sessions. Every session consumed 30 minutes fifty minutes apart between sessions. A Variety of teaching methods and materials used throughout conducting the educational program such as demonstration, Power Point presentation, interactive videos and posters and a handout booklet provided for each worker. Three sessions conducted for each group.

The 1st session included study workers explanation of the expected outcomes of the program and time table of sessions. Additionally provided discussion about definition, types of occupational hazards, consequents health effects as a result of occupational exposure to pollutants and suggested preventive/safety measures.

The 2nd session consisted of **theoretical part** as definition, causes, risk factors of back pain, precautions to be taken to reduce occurrence of back pain, importance & steps of hand washing and back stretching techniques.

Practical part as performing hand washing steps, then taking back-stretching exercises to be applied in

the future either for prevention or reduce back pain using observational checklist.

Applying hand washing technique

Applying back-stretching exercises:

Exercise 1: Alternate Arm and Leg (Bird Dog)

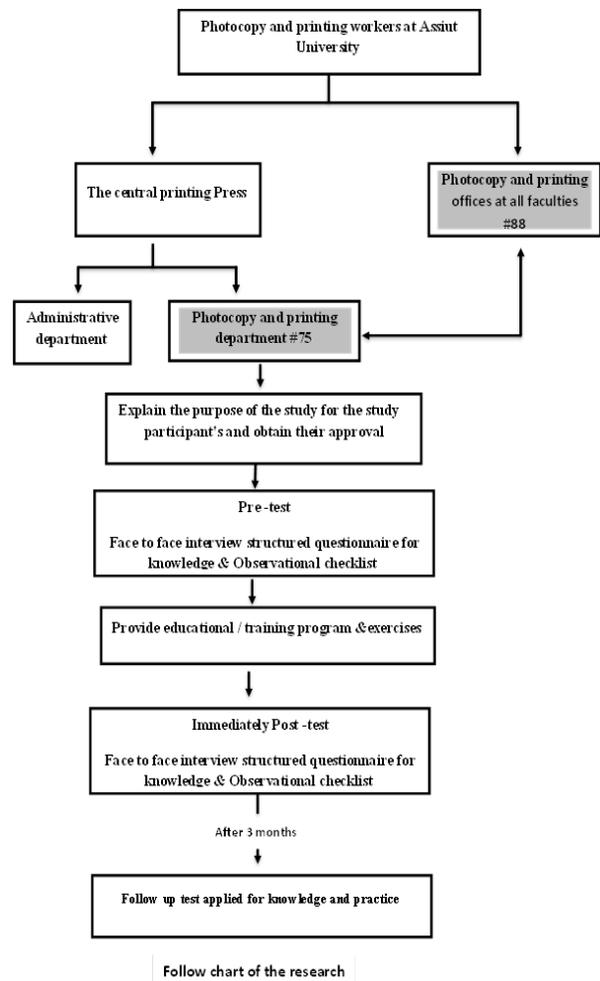
Exercise 2: Backward Bend

Exercise 3: Bridging exercise

Evaluation phase

Using the same pre-test tools to evaluate photocopy and printing workers' knowledge and practices, the post-test was done after the program's implementation immediately by re-application of back exercise and hand washing. Elsewhere the researcher re-interviewed the study participant's.

Follow-up test was done three months later after the completion of the program.

**Ethical consideration:**

Written approval was gained from Ethical Research Committee in The Faculty of Nursing, Assiut University (Approval no: 1120230295). Strict oral consent was obtained from the studied workers. The

researcher has clarified the study's aim was clarified to all participants included in the study. All obtained information would be strictly confidential.

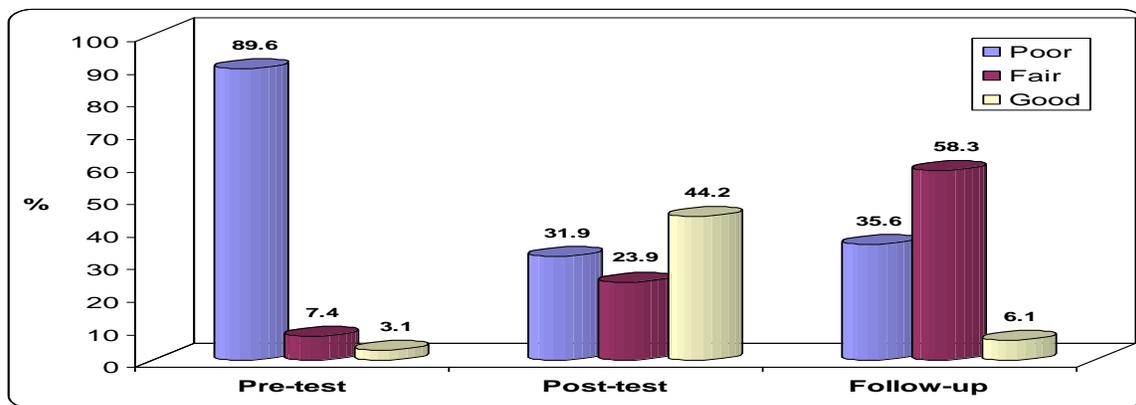
Statistical design :

Statistical Package for Social Science (SPSS version 22) was used for data entry and data analysis. Data were presented as numbers and percentages, means and standard deviation. ANOVA was used to compare between means of the three related groups (pre-test, post-test and follow-up test). Chi-square test used to compare between qualitative variables. Independent sample t-test was used to compare quantitative variables between two groups. The P – Value considered a statistically significant if it was < 0.05.

Results

Table (1): Personal and occupational data of the studied workers, Assiut University, 2022

Variables	No. (163)	%
Age: (years)		
< 40	62	38.0
40 - 50	65	39.9
> 50	36	22.1
Mean ± SD (Range)	43.06 ± 8.59 (27.0-59.0)	
Gender		
Male	145	89.0
Female	18	11.0
Marital Status:		
Single	15	9.2
Married	140	85.9
Divorced	5	3.1
Widow	3	1.8
Educational level:		
Basic education	24	14.7
Secondary/ institute	111	68.1
University / postgraduate	28	17.2
Previous work before joining the printing press:		
Yes	24	14.7
No	139	85.3
Years of experience:		
Less than 5 years	18	11.0
More than 5 years	145	89.0
Working hours/ day:		
Less than 8 hours	66	40.5
More than 8 hours	97	59.5
Performed job tasks:		
Printing and photocopying	70	42.9
Lifting and transferring printing papers	20	12.3
Binding and packaging	56	34.4
Stock	17	10.4



**Chi-square test

Paired samples t-test *

Fig (1): Total scores of studied workers' knowledge in pre, post and follow up test regarding occupational health hazards and safety measures, at Assiut University, 2022

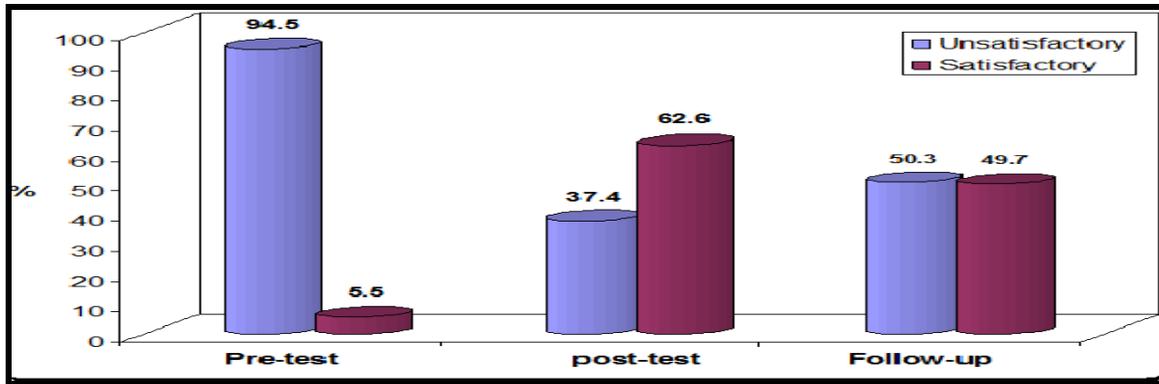
Table (2): Relationship between total mean scores of knowledge and personal and occupational data among studied workers at pre, post and follow up test, at Assiut University, 2022

Variables	Knowledge score		
	Pre-test Mean ± SD	Post-test Mean ± SD	Follow-up Mean ± SD
Age: (years)			
< 40	6.61 ± 2.83	40.82 ± 12.91	31.85 ± 8.04
40 – 50	7.11 ± 3.67	40.25 ± 11.80	31.95 ± 7.57
> 50	7.36 ± 4.05	39.08 ± 13.44	32.89 ± 6.14
P-value	0.545	0.805	0.782
Gender:			
Male	7.12 ± 3.63	39.39 ± 12.63	32.23 ± 7.41
Female	5.78 ± 0.94	46.78 ± 9.81	31.28 ± 7.83
P-value	0.120	0.018*	0.611
Educational level:			
Basic education	6.08 ± 0.83	31.50 ± 9.26	34.17 ± 6.40
Secondary/ Institute	6.82 ± 3.22	41.42 ± 12.52	32.39 ± 7.07
University/ Postgraduate	8.36 ± 5.12	42.86 ± 12.31	29.32 ± 9.00
P-value	0.042*	0.001*	0.051
Marital status:			
Married	7.12 ± 3.70	40.39 ± 12.62	31.86 ± 7.44
Not married	6.09 ± 0.73	39.13 ± 12.27	33.70 ± 7.34
P-value	0.185	0.658	0.275
Previous work			
Yes	6.67 ± 3.57	39.88 ± 12.54	32.17 ± 5.45
No	7.03 ± 3.45	40.27 ± 12.59	32.12 ± 7.74
P-value	0.637	0.888	0.975
Years of experience			
Less than 5 years	6.06 ± 1.47	41.89 ± 12.24	32.50 ± 7.31
More than 5 years	7.09 ± 3.62	40.00 ± 12.60	32.08 ± 7.47
P-value	0.233	0.548	0.820
Receiving previous health education/ training			
Yes	6.92 ± 3.51	40.70 ± 11.84	32.67 ± 6.54
No	7.01 ± 3.45	39.92 ± 12.98	31.81 ± 7.92
P-value	0.869	0.704	0.478

ANOVA test

Independent samples t-test

* Statistically significant difference (p<0.05)



**Chi-square test

*Paired samples t-test

Figure (2): Total scores of practice level scores at pre, post-test and follow-up test among studied workers, at Assiut University, 2022

Table (3): Relationship between total mean scores of practice and personal and, occupational data at pre-test, posttest and follow-up test, at Assiut University, 2022

Variables	Practice score		
	Pre-test	Post-test	Follow-up
	Mean ± SD	Mean ± SD	Mean ± SD
Age: (years)			
< 40	3.76 ± 1.12	18.03 ± 2.80	14.47 ± 4.19
40 - 50	3.95 ± 1.43	17.00 ± 2.88	14.49 ± 4.39
> 50	4.39 ± 1.15	15.67 ± 2.77	10.61 ± 3.03
P-value	0.011*	0.001*	0.001*
Gender:			
Male	3.91 ± 1.08	17.19 ± 3.02	13.88 ± 4.41
Female	4.27 ± 1.23	16.39 ± 2.15	11.56 ± 3.07
P-value	0.137	0.280	0.031*
Educational level:			
Basic education	3.44 ± 1.20	16.88 ± 2.83	12.08 ± 4.81
Secondary/ Institute	3.76 ± 1.03	17.15 ± 2.93	13.44 ± 4.06
University/ Postgraduate	4.34 ± 1.12	17.07 ± 3.18	15.68 ± 4.40
P-value	0.001*	0.915	0.008*
Marital status:			
Married	3.96 ± 1.42	17.16 ± 3.03	13.77 ± 4.33
Not married	4.29 ± 1.23	16.70 ± 2.36	12.74 ± 4.34
P-value	0.232	0.481	0.291
Previous work before joining the printing press:			
Yes	4.38 ± 1.18	17.08 ± 2.86	13.33 ± 4.36
No	3.86 ± 1.14	17.10 ± 2.97	13.68 ± 4.34
P-value	0.032*	0.979	0.722
Years of experience in photocopies and printing press:			
Less than 5 years	3.55 ± 1.25	16.00 ± 2.28	12.28 ± 2.82
More than 5 years	4.31 ± 1.12	17.23 ± 3.00	13.79 ± 4.46
P-value	0.002*	0.093	0.162
Receiving previous health education/ training			
Yes	4.45 ± 1.30	17.17 ± 3.20	14.60 ± 4.26
No	3.42 ± 1.61	17.06 ± 2.80	13.06 ± 4.30
P-value	0.007*	0.821	0.028*

ANOVA test

Independent samples t-test

* Statistically significant difference (p<0.05)

Table (4): Correlation between total score of knowledge score and practice among studied workers at pre-test, posttest and follow-up test, at Assiut University, 2022

Knowledge score	Practice score		
	Pre-test	Post-test	Follow-up
r-value	0.396	0.620	0.411
P-value	0.005*	0.001*	0.002*

* Statistical significance difference at $p < 0.05$

Pearson correlation

Table (1): It reveals that the mean age of photocopy and printing workers ranged from 27.0-59 years, male workers represent 89.0% of them. Also, 89.0% of studied sample had more than five years of job experience and 42.9% of them worked at printing & photocopying sector.

Figure (1): It was cleared that 89.6% of studied workers had poor level of knowledge in pretest, while their knowledge enhanced in posttest to good 44.2%. After three months later for follow up test 58.3% of studied workers had fair knowledge.

Table (2): It cleared that statistical significance difference between total mean score of knowledge and studied workers' educational level at pre and posttest (0.042, 0.001) respectively and there was no statistical significance difference between total mean score of knowledge and years of experience.

Figure (2): Displayed that 94.5% of studied workers had unsatisfactory practice at pre-test, this percent decreased at post-test and follow-up test to 37.4%, 50.3% respectively.

Table (3): Showed highly statistically significant difference between total score of practice and age at pretest, posttest and follow-up test at P-value < 0.05 . Moreover there was a statistical significance difference with educational level at pre-test and follow-up test 0.001, 0.008 respectively.

Table (4): Cleared that a statistically significant correlation between total scores of knowledge and practices at pre, post, and follow-up tests at ($r = 0.396, 0.620, \text{ and } 0.411$) and ($p\text{-value} = 0.005, 0.001 \text{ and } 0.002$) respectively.

Discussion

Workplace health risks endanger a huge proportion of the world's population. Significant development in scientific and technology advancements might lead to an increase in many health hazards. Photocopy and printing workers are typically exposed to a variety of dangers, including physical, chemical, mechanical, ergonomic, and biological hazards. Musculoskeletal, respiratory, integumentary, and digestive systems are all affected. A safe working environment and practices are essential for preventing work-related health problems and disability.

The present study aimed to evaluate the effectiveness of educational program on knowledge and practices

regarding occupational safety measures among photocopy and printing workers. With referral to the studied workers' the mean age was (mean \pm SD) 43.06 ± 8.59 years, also, **Ibrahim et al., (2019)** who conducted a study about "Occupational exposures and health profile among workers in an Egyptian printing press" and reported that the mean age of the studied participants was (mean \pm SD) 42.65 ± 9.33 . Similarly, **Agbenorku et al. (2012)**, steered a study titled as "A prospective study of diseases associated with workers in the printing industry in a City of Ghana", found that the mean age between the studied workers was from 18-65 years.

The finding of the current study were mismatched with a study about health effects of occupational exposure to printer emissions on workers in China, included workers who more than sixteen years old (**Lyu et al., 2021**).

The majority of study participants in the present study, were males, this is noticed working in photocopy and printing offices requires physical strength to remove, store and hold printed papers. These results in accordance with **Decharat (2014)** who conducted a study in Thailand under the title "Prevalence of acute symptoms among workers in printing factories, and **Foong et al. (2014)** who studied "Prevalence of musculoskeletal symptoms among production line workers in a printing manufacturing company, Malaysia" revealed that more than three fifths were male.

With regards to level of education among studied participants', it was observed that more than three-fifths of study workers had secondary education. It may be referred to as working in photocopy offices and printing press depends heavily on practice and experience rather than education. These results of the current study approved with **Lise et al. (2018)**, "Occupational dermatoses reported in Brazil from 2007 to 2014", stated that more than half of studied workers had not completed high school; in addition **Yilmaz et al. (2015)**, conducted a study on "Safety in Turkish printing and publishing sector; evaluation of awareness levels of the workers on health and safety issues" were declared that two fifths of workers had secondary school education.

The finding of the current study was in contrast with **Butt et al. (2014)**, "Study of physical, chemical and

ergonomic occupational hazards faced by photocopier machine operators" who found that only quarter had middle (university) level of education.

With respect to years of job experience, the existing data exemplified that the majority of studied workers had more than five years of work besides nearly three-fifths of them spend more than eight hours per day.

Additionally, **Agbenorku et al. (2010)** who studied "Traumatic injuries among printing press workers in Kumasi (Ghana)" and stated that about three quarters of studied workers had a period from 5-10 years of work experience. The current finding in line with **Decharat (2014)** who reported that more than three-fifths of study participants' worked for more than 8 hours daily.

In contrast, **Yilmaz et al. (2015)** were conducted a study and concluded that about two fifths of the workers had years of experience only from 0-3 years. Regarding to performed job tasks, the present study findings concluded that more than two fifths of studied participants operated in the sector of printing and photocopying, as it represent the main and large sector at Assiut central printing press. Similar findings noticed by **Nasrin et al. (2018)**, conducted a study about "Common health problems of workers in selected press industries of Dhaka City", and their results revealed that more than three fifths of studied workers actually worked at printing sector. Likewise, **Agbenorku et al., (2012)** revealed that two fifths of study participants worked in printing department.

With concern to total knowledge score among studied workers, the current findings showed that the majority of studied workers have poor knowledge scores in the pre-test, this may be due to photocopier and printing workers not attend educational courses about occupational health hazards. On the other hand their knowledge score enhanced in post-test. Three months later for follow up test their knowledge indicated that slightly less than three fifth of studied workers had fair knowledge. This is might referred to the effectiveness of introducing an educational program to the studied workers about occupational health hazards and safety precautions during working in photocopying and printing.

Dissimilarity with **Agbenorku et al. (2010)** who informed that the majority of the respondents had knowledge on health safety measures.

Concerning to Relationship between total knowledge score and personal data among studied workers at pre, post and follow up test. It displayed that statistical significance difference between total knowledge score and level of educational at pre and post-test, and there was no statistical significance difference between total knowledge score with age and years of experience. This study in line with **Mourad (2021)**

who discussed that a prevalence of the musculoskeletal symptoms slightly more than three quartets, with a significant strong positive associations were noticed with studied workers' age, and the duration of employment ($p < 0.001$).

In accordance to total score of practice, it was noticed that the vast majority of studied workers had unsatisfactory practice at pretest; these may be referred to lack of seminars or training courses about preventive measures among photocopier and printing workers. Furthermore, these scores significantly improved at posttest and follow-up test; this improvement may be as a consequent of steering the educational program. Also, **Basheer et al. (2019)**, "Knowledge, attitude, and practice of printing press workers towards noise-induced hearing loss", declared that studied employee had poor practice. Also, **Ibrahimi et al. (2022)** conducted a manuscript about "Effectiveness of a training program on the low back pain and functional disability in industrial workers" they are concluded that after the intervention, a decrease in the functional disability and low back pain scores were observed in the intervention group. In contrast **Livesley et al. (2002)** made a study in United Kingdom about "The prevalence of occupational dermatitis in the UK printing industry" and informed that printing workers exhibited the frequency use of personal protective measures and practicing hand washing and the use of cleaning products while work. Moreover, **Rose et al. (2023)**, "Knowledge, attitudes and practices of screen printers on toxic risks related to their profession in Yaoundé (Cameroon)" revealed that more than one quarter had adequate practices.

Finally there were statistical significance difference between total mean practice score and age at pre, post and follow-up test, also, educational level and years of experience at pre-test p-value 0.001, 0.002 respectively. It may be as a result of gained experiences gained throughout time. Also, there was statistical significance difference between overall score of knowledge and practices at pre, post and follow up test at p-value = 0.005, 0.001 and 0.002 respectively.

The current study steered among all photocopier and printing workers at Assiut University (male and female), while other previous studies focused on male workers. Also, the study findings focused on classifying study participants' knowledge of occupational hazards and their consequences on health. In addition an educational program introduced for preventing and promoting occupational health complaints. Work overload among studied workers especially at the beginning of first semester represented some limitation while data collection stage.

Conclusion:

The current study proved that there was lack of knowledge and practice among photocopy and printing workers regarding occupational safety measures, which significantly enhanced after program implementation, which confirmed the study hypothesis.

Recommendations:

1. Continuing education program for the photocopy and printing workers at Assiut University in order to reduce occupational hazards and to adopt protective measure for the purpose of improving health.
2. Further researches on a larger study sample are needed to allow for generalization of the study results.
3. Supplements future studies by investigation to draw the effect of occupational exposure on workers' health.

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