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Effect Of Educational Program On Occupational Health And Safety Competencies Among Flour Mill Workers.

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ABSTRACT
Background: *The Flour Mill workers are prone to face a number of health problems and risks. due to the lack of Personal Protective Equipment's utilization (PPE)*
Aim: *The purpose of the current study is to evaluate the effect of educational program on occupational health and safety competencies among Flour Mill workers..*
Design: *A quasi-experimental one-group pre test-post test was used.*
Setting: *the study was conducted in South Cairo & Giza Mills & Bakeries Company.*
Sample: *A convenient sample of 169 flour mill worker.*
Results: *showed A highly significant relations between workers determinants occupational health and safety competencies regarding PPE utilization after participation in the program, p -value < 0.05.*
Conclusions*: Findings demonstrated that workers whom received a health educational program had a positive predictive relationship between workers characteristics and experiences and their behaviour-specific cognitions and affect related to occupational health and safety competencies at Flour mill company.*
Recommendation*: Organizing training programs to Flour Mill workers on occupational health and safety competencies that covers all Flour Mills in different settings in Egypt.*
Keywords: *Educational Program, Occupational Health and Safety Competencies and Flour Mill workers.*

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I. Background

Flour Milling began 6000 years ago and is considered the oldest trade industry. It involves the breakdown of grain to separate its outer covering and grinding of inner endosperm to small flour particles .Concerning the health and safety of the workers serving in the mentioned industry, they have been in an environment exposed to flour dust. Many workers are working in these industry on a contract basis, subject to the high risk of occupational health hazard due to lack of safety, unawareness, unavailability of PPE, health and safety measures (Alemseged,etal. 2020). [4]

The use of personal protective equipment (PPE) – especially masks has become common event for people around the world. Personal protective equipment is designed to protect workers from severe workplace injuries or illnesses resulting from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. It may include items such as gloves, safety glasses and shoes, earplugs or muffs, hard hats, respirators, or coveralls, vests and full body suits. It is a significant determining factor between an accident and safety in the working environment. Evidence suggests that wearing the correct personal protection at all times is extremely important in reducing accidents and should be given high priority (WHO, 2020). [6]

According to a study conducted by Alemseged, et .al. (2020) [4] to assess chronic respiratory health symptoms and associated factors among flour mill workers in Addis Ababa, Ethiopia. With a total number of 424 samples of Flour Mill workers. The study reported that, chronic respiratory health symptoms were highly prevalent among flour mill industry workers. Also the study reveals that, there were no workers using proper personal protective mask/respirator. The organizations were provided pieces of cloths that were tied on the neck of workers to protect the entry of flour dust particles. But most of them did not use even those pieces of cloth due to a lack of sufficient supply. Most of them did not use the provided piece of clothes since some of them believed it weaken their ability to work , some of them said it is not comfortable, and the other reason was inefficient for protecting the dust particles. Most of the females were used the provided piece of cloth in the workplace. Even though the organization did not provide PPE, females also used their own cloths for protecting themselves from flour dust. [5]

So, the practice of personal protective equipment should be encouraged in the Flour Mill Company for the promotion of occupational health and safety competencies .Educational health program based on health belief model of workers is crucial for effective and efficient practices of occupational health and safety competencies in work environment. [2]

Aim of the study:
The current study aims to evaluate the effect of educational program on occupational health and safety competencies among Flour Mill workers

Research Hypothesis:
The post-test mean score of the determinants occupational health and safety competencies (DOHSC) of Flour Mill workers who are exposed to educational program based on Health Belief model will be higher than pre-test –mean scores.

Operational definitions
Occupational health and safety competencies: are the manners of appropriate training builds both knowledge and skills and consequently may promote correct utilization of personal protective equipment that intended to prevent accident and occupational disease which rose from hazards of Flour Mill Company. Hence it will help workers indirectly to work in a safe environment.

II. Material and Method:

Design
A quasi-experimental one-group pre-test, immediate and post-test design was used.

Setting: This study was conducted t South Cairo & Giza Mills & Bakeries Company

Sampling
A convenient sample of 169 flour mill worker.

Tools and data collection: Data of this study was collected through three tools:
Tool I: Flour Mill worker's characteristics and experiences related to PPE questionnaire: It include three parts: a) The first part includes worker's personal factors which include the following:1-Demographic characteristics of workers as age, educational level, working hours, types of work, etc.2-Self-reported health problems of the workers during last 6 months which include respiratory problems, musculoskeletal problems, vision problems, varicose veins, headache and teeth ache.3-Occupational hazards facing the workers as physical (as heat, noise,etc), chemical(as dust ,smog ,etc), biological (virus ,bacteria ,etc), mechanical/ergonomic(lifting heavy weights, repetitive movement,etc) and psychosocial hazards (as stress ,noise ,burnout,etc). b)The second part includes workers knowledge of personal protective equipment questionnaire. It was developed by the researchers after extensive review of literature. It consists of questions related to definition, benefits, uses, types, etc. It will be used as pre –post tests. **Scoring system:** For knowledge, the correct answer (good) was given 2, the correct and incomplete answer (average) was given 1, while the unknown or wrong answer (poor) was given 0.A total score of knowledge will be computed by summing correct responses of all questions. Total knowledge will be categorized as good (≥75%),average(50% to ≤ 75%) and poor knowledge (<50%) (Khodaveisi,Omidi,Farokhi& Soltanian,2016) [7].c)The third part includes personal protective equipment (PPE) observational checklist: It is was designed by the researchers after extensive review of literature to evaluate worker's use of PPE as gloves, mask, protective cloth, head cap, protective shoes, hearing protection and eye protection. It will be used as pre –post tests. The workers will be observed without being informed to avoid subject bias effect whereby workers may pretend to use PPE effectively when the assessment is made. **Scoring system:** For practice, worker will be scored 1 point if they adopted good use of PPE and 0 if they did not. A total score of practice will be computed by summing correct practice of the total performance. The practice will be categorized as good (≥75%),average (50% to ≤ 75%) and poor (<50%)(Khodaveisi,Omidi,Farokhi& Soltanian,2016). [7]

Tool II: The determinants of occupational health and safety competencies (DOHSC) questionnaire : It was developed by the researchers according to health belief model construct : Perceived susceptibility (4 items); Perceived severity (4 items); Perceived benefit (7 items); Perceived barrier (7 items); Internal cues to action (3 items); External cues to action (3 items) and perceived self efficacy(6 items) .**Scoring system:** All items (responses) of the DOHSC questionnaire will be scored on the basis of the 5-item Likert scale (0: don't know/not applicable, 1: strongly disagree, 2: often disagree,3: often agree and 4: strongly agree).The scores

were categorized into three levels: favorable (mean score of higher than 75), partly favorable (mean score between 50-75), and unfavorable (mean score of less than 50)(Khodaveisi,Omidi,Farokhi& Soltanian,2016). [7]

Tool III: Flour Mill Company's environment observational checklist: It was developed by the researchers after extensive review of literature. It was designed to evaluate Flour Mill Company environment as general cleanliness, ventilation and lightning, health and safety measure, and fire protection...etc. Each item will be scored as yes or no.

Validity & Reliability

Three experts from the community health nursing department and occupational and environmental medicine, Cairo University were asked to check the tools for content validity. Cronbach's alpha was used to determine internal consistency of the tools.Modifications was made according to the panel judges. The tool was tested for reliability using Cronbach's Alpha 0.78.

Data collection:

Data collected for the study before the educational program implementation, all workers completed informed consent, demographic characteristics, then the pretest conducted for assessment of the knowledge, and observational checklist of workers practices. Post test had conducted immediately and three months after the educational program implementation for all workers. The time spent to fill the questionnaires ranged between 10-15minutes (pre and posttest).The target group was divided into sub group in the same manner by the researchers. Duration of session was 20-30 minutes. Teaching methods and media included were group discussions & training, Arabic handout, demonstration, PPE sample and power point presentations. The program was implemented on 4 sessions from October 2022 till February 2023.

Data Analysis

Statistical Package for the Social Sciences (SPSS) program, version 26. Numerical data were expressed as means and standard deviations. Quantitative data were expressed as frequencies and percentages. Comparison between pretest, posttest, and 3 months follow up test was done by using t-test and ANOVA.

III. Results

Table (1): Percentage distribution of demographic characteristics of the Flour Mill workers (N=169).

Demographic characteristics	**No**	**%**
Age		
18 < 25	20	11.8
25 < 50	116	68.3
≥ 50 +	33	19.5
(mean ±SD) 36.9± 8.77		
Income		
enough	15	8.8
Enough and more	0	0.00
not enough	154	91.2
Level of education:		
Doesn't read and write	3	1,7
Read and write	6	3.5
Diploma	149	88.3
University	11	6.5
Working experience		
< 5 years	20	11.8
5 < 10yrs	66	39.1
10 < 15 yrs	50	29.6
≥ 15 yrs	33	19.5
(mean ±SD) 13.17± 5.46		

Table (1) shows that, two third (68,3 %) of the Flour Mill workers aged from 25 years to less than 50 years old, while 11.8 % aged from 18 years to less than 25 years old and 19.2 % aged 50 years or more with a mean age 36.9years and SD ± 8.77. Regarding level of education, majority of the workers had diploma

education. Working 5 to less than 10 years represented 39.1% while working 10 to less than 15 years accounted for 29.6%. Almost majority of the workers (96.6%) had no enough income.

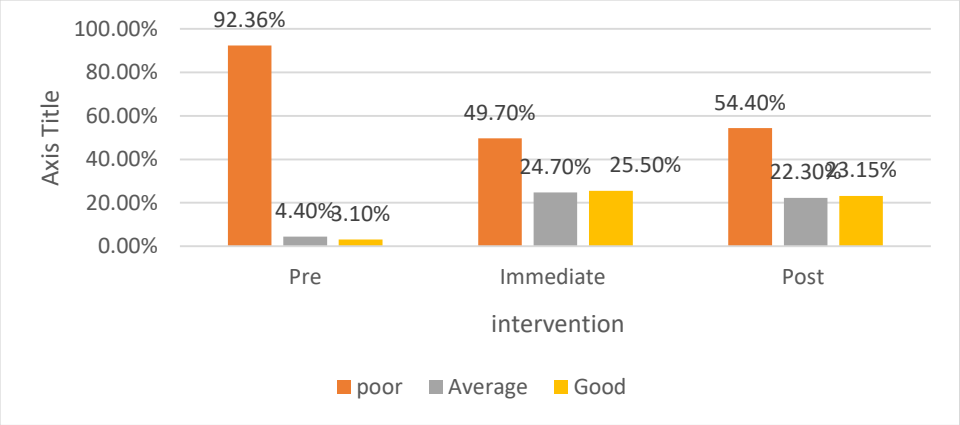

Fig. (1): percentage distribution of total knowledge score among workers through intervention (N=169).

Figure (1) presents a significant improvement in workers knowledge percentage immediately (1month later) and post the program implementation (3months later).

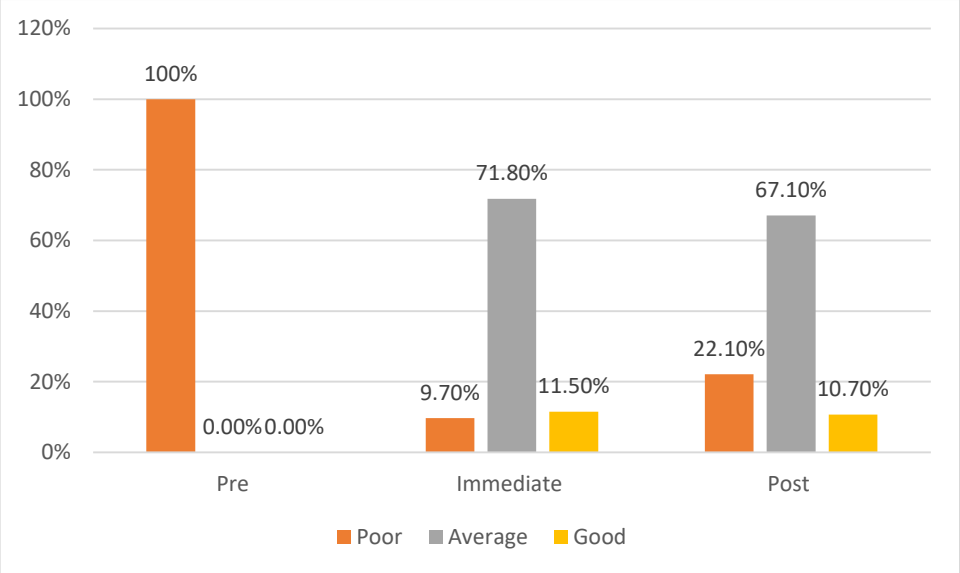

Fig. (2): percentage distribution of total practices scores among workers through intervention (N=169):

Figure (2) demonstrates a significant improvement in the percentage of workers observed practices immediately and post the program.

Table (2): The relation between the determinants of occupational health and safety competencies of Flour Mill workers regarding PPE utilization through intervention (N=169).

Item	Intervention time [n (%)]	Don't know/ Not applicable (0)	Strongly disagree (1)	Often disagree (2)	Often agree (3)	Strongly agree (4)	X2	p
Perceived susceptibility	*PRE*	9(5.3%)	31(18.4%)	12(7.1%)	30(17.8%)	87(51.5%)	224.4	0.000
	Immediate	0(0%)	0(0%)	14(8.3%)	9(5.3%)	146(86,4%)		
	Post	0(0%)	0(0%)	9(5.3%)	10(5.9%)	150(88.8%)		
Perceived severity	*PRE*	11(6,5%)	7(4.2%)	31(18.4)	30(17.8%)	90(53.3%)		
	Immediate	0(0%)	5(2.9%)	5(2.9%)	9(5.3%)	150(88.8%)		
	Post	0(0%)	2(1.2%)	8(4.7%)	6(3.6%)	153(92.3%)		
Perceived benefits	*PRE*	161(95.3%)	0(0%)	4(2,4%)	3 (1.8%)	1 (0.6%)	281.1	0.000
	Immediate	0(0%)	0(0%)	3(1,8%)	71(42.1%)	95(56.2%)		
	Post	0(0%)	0(0%)	30(17.8%)	31(18.4)	108(63.9%)		
Perceived barriers	*PRE*	31(18.4)	30(17.8%)	11(6,5%)	7(4.2%)	90(53.3%)	91.57	0.001
	Immediate	15(8.9%)	15(8.9%)	2(1.2%)	29(17.2%)	108(63.9%)		
	Post	11(6,5%)	9(5.3%)	12(7.1%)	37(21,8%)	100(59.2%)		
Internal cues to action	*PRE*	13(7.7%)	37(21.9%)	33(19.5%)	46	40(23.7%)		
	Immediate	11(6,5%)	44(26.1%)	32(18.9%)	12(7.1%)	70(41.5%)		
	Post	13(7.7%)	45(26.7%)	39(23.1%)	12(7.1%)	70(41.5%)		
External cues to action	*PRE*	10(5.9%)	43(25.5%)	46	33(19.5%)	37(21.9%)	130.9	0.000
	Immediate	10(5.9%)	71(42.1%)	12(7.1%)	32(18.9%)	44(26.1%)		
	Post	9(5.3%)	74(43.8%)	12(7.1%)	39(23.1%)	45(26.7%)		
Perceived self-efficacy	*PRE*	40(23.7%)	17(10.1%)	38(22.5%)	46(27.2%)	28(16.6%)	158.7	0.001
	Immediate	5(2.9%)	5(2.9%)	19(11.3%)	62(36.7%)	78(46.1%)		
	Post	5(2.9%)	5(2.9%)	3(1,8%)	23(13.6%)	133(78.7%)		

Table (2) depicts highly significant relations between workers determinants occupational health and safety competencies (Perceived susceptibility ,perceived severity , perceived benefits, perceived barriers, internal & external cues to action and perceived self- efficacy) and the pre-test, immediate test and post-test score, p -value < 0.05.

IV. Discussion

Occupational health and safety competencies are neglected and often given less attention. Negligence of occupational health and safety competencies in day to day Flour Mill workers life is seen. It can prevent the workers from occupational diseases and accidents and same time increased the efficiency of workers. [5] Having proper occupational health and safety competencies measures against industrial accidents and occupational health hazards is the fundamental right of all workers.[2]

Findings of the present study revealed that workers' knowledge total score about PPE utilization were statistically significant improvement among workers' post-test program implementation. This improvement in knowledge score of workers' post-test program may be due to the health education program implementation and booklet. As well as, workers' education is not an once time session and there is immediate test following the program implementation.

In accordance with a study conducted by Ahmad et al. (2018)[3] to assess the availability and use of PPEs as well as self-reported occupational exposures among workers in surveyed small industries in Saudi Arabia. The study found that, lack of education limits workers accessibility to knowledge, information and training prospects along with putting them at a greater risk to injuries, diseases and other negative health outcomes. Studies proved that small scale enterprises workers have deficiency of understanding, knowledge and information on proper use of PPEs and are least aware of health effects resulting from the workplace activities and materials.

Also the results of the present study in accordance with a study conducted by Abdelwahab, Bader EL-Din and Mohammed (2019) [1] in Minia governorate at Egypt, to assess effect of health education program on knowledge and practice of workers regarding occupational health hazards at sugar factory. The study illustrates that, all workers of the study sample had poor knowledge about Personal Protective Equipments with unsatisfactory self-reported practice regarding PPE and first aids. Also, the study showed that, there was highly

statistically significant improvement of worker's knowledge and self-reported practices regarding PPE utilization after implementation of the health education program.

The present study demonstrated workers' practices regarding PPE utilization. Poor pre-test practice could be due to inadequate utilization due to poor workers training and awareness. It is apparent from these results that workers may lack awareness about PPE utilization to avoid work related health problems and injury. In addition, low income and low level of education among those workers might have played a role in not following the occupational health and safety competencies. Also, these results might shed light on the lack of monitoring work environment and following occupational standards stipulated by the Work and Environment laws.

In accordance with a study conducted by Alemseged, et .al. (2020) [4] to assess chronic respiratory health symptoms and associated factors among flour mill workers in Addis Ababa, Ethiopia. The study illustrated that; majority of participants were aware about occupational hazard but their practice level of personal protective equipment is low for protecting themselves. So, the practice of personal protective equipment should be encouraged in the Flour Mill companies for the promotion of occupational health and safety behavior.

Findings of the present study revealed that, there were a sign of significant improvement in workers post test score regarding utilization of PPE. It appears that the improvement in practice score of workers' post-test program due to the health education program based on health belief model sessions, demonstration and booklet. As well as, workers' education is not an once time session and there is immediate test following the program implementation. The study findings support the research hypothesis regarding occupational health and safety competencies of PPE utilization of the post-test group after participated in the educational health program that showed statistical significant increase in knowledge and practice of Flour Mill workers regarding PPE utilization $P < 0.05$ .It was observed that, there was decline in the number of workers poor practices regarding PPE utilization.

Findings of the present study depicts highly significant relations between workers determinants occupational health and safety competencies (Perceived susceptibility ,perceived severity , perceived benefits, perceived barriers, internal & external cues to action and perceived self- efficacy) and the pretest, immediate test and posttest score, p -value < 0.05.

In the present study, the PPE most often mentioned as a requirement were mask, safety shoes, gloves, etc. the perceived susceptibility and severity listed in the present study were consistent with a study conducted by Abdelwahab, Bader EL-Din and Mohammed (2019) [1] in Minia governorate at Egypt, to assess effect of health education program on knowledge and practice of workers regarding occupational health hazards at sugar factory. The study illustrates that, all workers aren't knowledgeable about susceptibility and severity of not using PPE .Also, the study showed that, there was highly statistically significant improvement of worker's knowledge regarding PPE utilization after implementation of the health education program.

The perceived benefits listed in the present study were consistent with a study conducted by Wright, Adhikari, Yin, Vogel, Smallwood and Shah (2019)[8] to examine wastewater worker's beliefs and practices on wearing PPE in USA. Findings indicated that workers weren't knowledgeable of mandatory PPE that is required to wear during their work. It is supposed that prior knowledge of workers about safety measures increased their utilization and compliance with PPE in their industries.

Also, the perceived barriers listed in the present study were consistent with findings from the last study[8]. Unavailability of PPE and equipment being expensive may be a barrier that hinders PPE compliance among Flour Mill workers. It is suggested that training workers on safety measures is vital in increasing their knowledge, competence, and use of PPE at the workplace. Regarding the perceived self-effcacy of PPE utilization compliance, Flour Mill workers indicated that they agreed that they are confident that the PPE utilization is the proper equipment to protect them from hazards exposure. Therefore, the workers confidence increases through wearing PPE. Therefore, internal and external cues to action could be important factors that increase PPE compliance in industries.

V. Conclusion:

Based on the study results, it can be concluded that knowledge and observed practices of Flour Mill workers had been improved after program implementation with statically significance differences between pre, immediate, and post-test (3 months later). The workers whom received a health educational program had a positive predictive relationship between workers characteristics and experiences and their knowledge and skills related to occupational health and safety competencies at Flour Mill Company.

VI. Recommendations:

According to the result, the following recommendations are suggested:

1. Organizing training programs to Flour Mill workers on occupational health and safety competencies that covers all Flour Mill Company in different settings in Egypt.
2. Enforcing the labour law in relation to pre-employment medical, periodic examination and health insurance of Flour Mill workers.

VII. Ethical consideration:

The researchers emphasized that participation in the study was entirely voluntary, written informed consent was obtained from each participant, after explanation of the study objectives and procedures. Anonymity and confidentiality were assured. Participants were assured that all data would not be reused in another research without taking the permission of the participants.

Source of Support: Self
Conflict of Interest: None

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