

Effect of Educational Intervention on Knowledge and Practices of Bakery Workers about First Aid Related to Occupational Hazards

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Abstract

Bakery workers face many hazards in their work environment, and these hazards may cause injury or illness. The aim of this study was to assess the effect of educational intervention on knowledge and practices of bakery workers about first aid related to occupational hazards. A quasi-experimental design was used. Simple random samples composed of One hundred and eleven bakeries were recruited in Zagazig City. Two tools were used: Tool (I): Demographic characteristics, job characteristics of bakers, job exposures and related signs/symptoms, and knowledge of first aid among bakers. Tool II. Bakers practice observation checklist about first aid and ergonomic maneuvers, and work environment safety of the bakeries. Results: The greatest hazard related to job exposure was physical (53.2%) followed by psychological stress (36.9%). The major health problems reported by bakers were headache (65.8%), bone aches (54.1%) followed by arrhythmia (45.9%), and dry cough (45%). The total satisfactory score of knowledge increased from 16.2% in pre intervention to 100% at post intervention, only 0.9% of the bakery workers had total adequate practices about first aids before intervention compared with 75.7% with significant difference between scores of before and post- intervention at $p < 0.001$. Conclusion: An improvement was noticed between the bakery workers before and after intervention implementation related to their knowledge and practices of all first aid items and ergonomic maneuvers. Recommendation: Continuous educational intervention should be initiated for all workers of bakeries in Sharkia Governorate to raise their knowledge and practices about first aid, and ergonomic maneuvers.

Keywords: Bakery workers, First Aid, Knowledge, Occupational Hazards, Practices.

Introduction:

The nature of work in bakeries exposes workers to a dangerous environment. They should be instructed on how to avoid potential health problems and should be properly trained to follow recommended work safety instruction⁽¹⁾. An occupational hazard is a known threat in a bakery and can include many types of threats such as physical, chemical, biological, psychological, mechanical, and environmental. Physical hazards such as temperature, light, cold, sound, ionizing radiation, heat and cold shivering, stress vibration also include bakery hazards, as chronic obstructive pulmonary disease (COPD), emphysema, and bronchial asthma. Chemical Hazards from exposure to chemicals in the workplace, there are many chemical hazards including breathing in dirt, fumes and metals and digesting toxic substances. Regional outcome and effect such as inflammation if the skin is called dermatitis, ulcer formation, and tumor⁽²⁾.

Occupational health and safety (OHS) is critical because it protects workers from injuries, and employers from serious harm. Work accidents cause huge losses accounting for about 3.94 percent of the world's annual gross domestic product according to the International Labor Organization (ILO). About 2.78 million occupational deaths are recorded each year worldwide, of which 2.4 million are associated with occupational injuries (ILO). Although the Egyptian constitution protects workers' health and safety, recent figures published by the International

Labor Organization show that there were more than 273,000 workers injured and/or harmed by occupational accidents in 2015⁽³⁾.

First aid is the initial assistance or treatment given at the site of accident to someone who is injured or suddenly taken ill, before the arrival of ambulance⁽⁴⁾. First aid is a key part of the company's emergency response system and overall health and safety program. Think about what would happen if someone at work suddenly stopped breathing and no one knew how to help that person. Availability and maintenance of trained first aid equipment, facilities, and first aid in the workplace is very important. Initial management of burns injury is paramount for the survival of burned victims. Good first aid and initial treatment can significantly decrease the severity and improve the survival of burns injury, community awareness of first aid for burns injuries in the general population have significant role to ensure self-rescue and help each other to reduce the severity as well as mortality in case of accident especially in mass casualty incidences⁽⁴⁾.

Work environment is an important determinant of health. It can negatively or positively affect health. Bakery work can be fun and rewarding, but some bakery operations can be dangerous⁽⁵⁾. Besides environmental exposure, occupational factors also play an important role in influencing employee health⁽⁶⁾. Repetition of working motions is often seen while handling dough in a baking job. According to⁽⁷⁾, workers involved in the production of bread and cake as well as the salesperson are susceptible to the

occurrence of work-related musculoskeletal disorders (MSDs). It is common to observe how moving, lifting and handling loads increases physical load and may contribute to mechanical tension in muscles, ligaments, joints and thus pain in the neck, back, shoulders, wrists, and other parts of the musculoskeletal system. A better understanding of workplace situations, identification of ergonomic real demand, and recommendations for better activity execution and worker safety and well-being are important to the bakery job ⁽⁸⁾.

Musculoskeletal disorders among bakers such as muscle pain and arthritis arise from manual handling and moving heavy loads, and other causes of musculoskeletal disorders include work that requires repetitive motions and poor work. Most of these factors result from poor consideration of ergonomic factors in the workplace. Ergonomics is the relationship between worker and job and focuses on designing work areas or work tasks to improve job performance⁽⁹⁾. The systematic ergonomic improvement process removes the risk factors that lead to musculoskeletal injuries and allows for the improvement of human performance and productivity ⁽¹⁰⁾.

Community health nursing have an essential role to focus on promoting, restoring bakers' health, and preventing their diseases in a safe and healthy environment through providing occupational and environmental health and safety services for workers in bakeries. Occupational health nurses have the potential to influence the health of a community and improve the general health of nation through public

health initiatives, reducing health inequalities, reducing social exclusion and sickness absence, by protecting and promoting the health of working population ⁽¹¹⁾.

Significance of the study:

The health hazards of bakery worker are a global concern today. Exposure to occupational hazards in bakeries generally refers to poor safety standards, careless handling, and causes serious injuries and health problems. Occupational heat stress has been linked with various heat-related health conditions and has been associated with occupational injuries caused by fatigue, reduced alertness, and decreased psychomotor performance. Heat stress at work is gaining more attention due to rising global temperatures attributed to climate change. Although heat stress is mostly observed and studied in outdoor work environments, heat-related illnesses are also a concern in indoor work environments due to high levels of heat radiating from ovens, stoves, and other heat-generating machinery ⁽⁸⁾. Providing first aids in the workplace during or after work accidents can lead to unpleasant consequences for the worker's health and life and practicing good ergonomics can help workers stay healthy ⁽⁹⁾.

The aim of current study

Was to evaluate the effect of educational intervention on knowledge and practices of bakery workers about first aid related to occupational hazards

Hypothesis:

Bakery workers' knowledge and

practice levels regarding first aid related to occupational hazards will be improved after educational intervention.

Subjects and Method:

Study design:

A quasi-experimental design was used to conduct this study.

Study setting

This study was conducted at 25 bakeries were chosen randomly from 124 bakeries in Zagazig City; each bakery is

composed of a mixing room, an oven place, a bread selling place, a changing room, a toilet, and a storage room.

Subjects:

All the bakery workers in 25 bakeries were chosen randomly from 124 bakeries in Zagazig City; from each bakery, 5–9 workers were appointed for the study, averaging 7 workers. The total number of bakery workers in this study was (111) workers.

Fuel and bread type

	Frequency	Percent
Fuel type:		
Gas	71	64.0
Kerosene	40	36.0
Bread type:		
Brown	109	98.2
White	2	1.8

Tools of data collections:

Two tools were used to achieve the objectives:

Tool I: A structure interview questionnaire form developed by the researchers and guided by (1,12). It consisted of four parts:

- **Part (1): Demographic characteristics of bakers. This part to assess demographic characteristics of bakers** as; age, gender, residence, education, marital status, and smoking.
- **Part (2):** Job characteristics of bakers, to determine the job characteristics of the bakers such as; current job (tanseem, baker, dough, sahlagui, cutting dough, vendor or spreading dough), working hours/day, experience years. Moreover, this part asks about workplace provides as; (job training, pre-placement exam, chest X-Ray, lab tests, health certification, updated and regular checkup), and finally had previous related job.
- **Part 3:** Job exposures and related

signs/symptoms, to describe Job exposures and related signs/symptoms of bakers as; physical (heat/noise/ lighting), chemical, biological, psychological stress, and ergonomic (heavy/lifting/awkward position/falls). As well, reported signs /symptoms as; skin (burns, dermatitis, and hair loss), eye (inflammation, cataract, conjunctivitis, and decreased visual acuity), gastrointestinal or GIT (anorexia, nausea, vomiting, and diarrhea), respiratory (asthma, wheezing, running nose, chronic cough, dyspnea, dry and reproductive cough, and chest pain), cardiovascular (arrhythmia, hypertension, and angina), neurological (dizziness and headache), and musculoskeletal (fatigue and bone aches), and varicose veins.

Scoring system:

- **For perception of hazards:** Items were scored 0, 1, and 2 for the responses never, once, and more than once, respectively. For each group of hazards, the scores of

the items were summed-up and the total divided by the number of the items, giving a mean score for the group. These scores were converted into percent scores. The group hazard exposure was considered high if the percent score was 60% or more and low if less than 60%.

- **For physical problems:** Items were scored 0, 1, and 2 for the responses never, once, and more than once, respectively. For each type of problems, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the type. These scores were converted into percent scores. The respondent was considered abnormal in the type of problems if the percent score was 60% or more and normal if less than 60%.

- **Part 4:** Knowledge of first aid among Bakers questionnaire. To assess Knowledge of first aid among bakers as; first aid definition, goal, phone, civil defense phone, essential pharmacy, wounds definition, wounds first aid, burns definition, 1st degree burns, burns first aid, asthma first aid, definition of syncope, syncope first aid, and proper position in ergonomic. **The Guttman Split-half Coefficient** of the instrument was **0.66**.

Scoring system for the knowledge items:

- A correct response was scored 1 and the incorrect zero. For each area of knowledge, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score, which was converted into a percent score. Knowledge was considered satisfactory if the percent score was 50% or more and unsatisfactory if less than 50%.

Tool II. An observational checklist developed by the researchers and guided

by **Fahmy et al (2011) and Yossif & Abd Elaal (2012)** ^(12&13). It consists of the following three parts:

- **Part (1):** An observational checklist of the bakery workers' practices about first aid. It consisted of four first aid as; wound care (10 steps), burns (nine steps), asthma (eight steps), and syncope (nine steps). As well, this part assess ergonomic maneuvers practice, which composed of three categories: **First**, lifting, as the use of the stronger leg muscles for lifting, bend at the knees and hips, keep the back straight, and lift straight upward in one smooth motion. **Second**, reaching, as standing directly in front of and close to the object, avoid twisting or stretching, use ladder for high objects, maintain a good balance and affirm base of support, and before moving the object, be sure that it is not too large or too heavy. **Third**, pivoting, place one foot slightly ahead of the other and turn both feet at the same time pivoting on the heel and the toe to maintain a good center of gravity while holding or carrying the objects; and **fourth**, avoid stopping as squat (bending at the hips and knees, avoid stopping) bending at the waist, and use the leg muscles to return to an upright position. **The Guttman Split-half Coefficient** of the instrument was **0.76**.

Scoring system for practices:

The items observed to be done were scored "1" and the items not done were scored "0". For each skill, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score, which was converted into a percent score, and means and standard deviations were computed. The practice was considered adequate if the percent score was 60% or more and inadequate if less than 60%.

- **Part (2):** Environmental assessment of the 25 bakeries observational checklist to evaluate work environment safety of the bakeries. This was designed by the researchers and guided by **Canadian Centre for Occupational Health and Safety (2017)** ⁽¹⁴⁾. It consisted of the following: training, work condition, work process, fire/emergency preparedness, safe exits, lighting, housekeeping, noise, employees' facilities, medical/first aid, personal protective equipment (PPE), and materials handling and storage. **The Guttman Split-half Coefficient** of the instrument was **0.76**.

Scoring system for work environment safety:

The safety items observed to be fulfilled were scored “1” and the items not fulfilled were scored “0”. The scores of the items were summed-up and the total divided by the number of the items, giving a mean score. A higher score indicated better safety of the work environment.

Content validity:

The validity of the data collection tools, and the content of the booklets were tested by three experts, one a professor from Community Health Nursing, Faculty of Nursing, Zagazig University, one a professor from Community Medicine, Zagazig University and a professor from Community Health Nursing, Faculty of Nursing, Cairo University to assess the clarity, suitability, application, and understanding of the tools. All recommended modifications have been made to the tools.

Field work:

After a formal permission was obtained to carry out the study, the researchers visited the bakeries. Each manager was

informed of the time and date of data collection. The data collection took a period of 3 months (from beginning of January to end of May 2022). The researchers started the data collection three times/week (Sundays, Tuesdays, and Thursdays) from 10.00 a.m. to 2.00 noon. The execution of the study was done through four phases: Assessment, planning, implementation, and evaluation.

Administrative and ethical considerations:

Permission to conduct the study was obtained by submitting an official letter from the Faculty of Nursing, Zagazig University referred to the Zagazig Health Administration to obtain permission to visit bakeries. Furthermore, consent to participate in the study was obtained from each bakery manager to apply the intervention. Moreover, oral informed consent to participate was obtained from each bakery worker after a full explanation of the study objective. They were informed that their participation in this study is voluntary. Bakery workers were given the opportunity to decline participation and were told that they could withdraw at any stage of data collection without giving any reason. They have been assured that any information obtained from them will be treated confidentially and will be used for research purposes only.

Tools development:

The researchers made changes to the tools after reviewing recent literature.

Tools Validity:

A jury of three experts in Community Health Nursing from the Faculty of Nursing and Faculty of Medicine at Zagazig University, and Faculty of Nursing at Cairo University assessed all

the study's tools for content validity, and proposed improvements were made.

Tools Reliability:

The Guttman Split-half Coefficient was used to conduct the reliability test, and the tools appeared to be reliable, where, Knowledge scale about knowledge about ergonomics was ($r = 0.66$), work environment safety of the bakeries ($r = 0.76$), which indicate high internal consistency.

Pilot study:

A pilot study was conducted before the start of data collection on 10% of the total studied sample (11 bakery workers) to test the feasibility of the study and the clarity and applicability of the tools, and the time needed to fill. Necessary adjustments have been made accordingly. Those who participated in the pilot study were excluded from the main study sample.

Data collection process:

The overall data collection process took about five months (beginning of January 2022 to end of May, 2022).

Program:

The educational intervention for bakery workers was implemented in the following stages:

I. Assessment phase:

This stage included data collection prior to the intervention for baseline assessment. The researchers introduced themselves first and explained the purpose of the research to bakery managers. All bakery workers employed in the selected bakeries were interviewed. Pretest questionnaires were distributed and then the same questionnaires were used after implementation of the intervention (1 month later) as a post-test for comparison. The time taken to answer the questionnaires ranged from 25 to 40

minutes each. Data were a preliminary test to provide the basis for designing the intervention sessions.

II. Planning phase:

Based on the literature review and results obtained from the assessment phase, the researchers designed the content of the intervention sessions. An illustrated booklet was prepared by the researchers, and after checking its content it was distributed to bakery workers for use as a self-learning guide.

a. Setting the program objectives

- **General objective:** The general objective of the bakery workers' sessions was to increase their knowledge and practices about first aid and ergonomics related to occupational hazards.

- **Specific objectives:** By the end of the sessions, the bakery workers should be able to do the following:

- 1- Identify the definition and goal of first aid.
- 2- List the first aid and civil defense phone.
- 3- Describe the essential pharmacy of first aid in the bakeries.
- 4- Discuss the definition and knowledge about first aid for wounds.
- 5- Identify the definition, degree of burns and burns first aid.
- 6- Recognize the knowledge of first aid for asthma.
- 7- Discuss the definition and first aid for syncope.
- 8- Explain the proper position in ergonomic maneuvers among bakery workers.
- 9- Apply adequate practice of wounds, burns, syncope, and asthma.
- 10- Demonstrate the ability to work according to ergonomic maneuvers.

III. Implementation phase:

The intervention was implemented in the form of sessions; it was implemented at their place of work (bakery). To ensure

that all bakery workers have the same educational experience, they all received the same content using the same training methods. The training methods included demonstration, individual discussion, role play, and reinforcement. The sessions were aided by using videos, pictures, and posters through laptop. The intervention was implemented in four theoretical sessions and two practical sessions.

IV. Evaluating phase:

The post educational intervention was evaluated after two months by applying the same pretest tools (knowledge and practice).

Statistical Design:

Data entry and statistical analysis were done using the Statistical Package for Social Science (SPSS),⁶ version 20.0 statistical software package. Quality control was done at the stages of coding and data entry. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables and means and standard deviations and medians for quantitative variables. Guttman's split-half Coefficient was calculated to assess the reliability of the scales through their internal consistency. Quantitative continuous data were compared using the non-parametric Mann-Whitney or Kruskal-Wallis tests. Qualitative categorical variables were compared using Chi-square test. Paired t-test was used for comparing dependent groups. Whenever the expected values in one or more of the cells in a 2x2 tables was less than 5, Fisher exact test was used instead. Spearman rank correlation was used for assessment of the inter-relationships among quantitative variables and ranked ones. Ecologic correlation analysis was used to relate

workplace safety and hazardous exposures. In order to identify the independent predictors of the knowledge and practice scores, multiple linear regression analysis was used and analysis of variance for the full regression models done. Statistical significance was considered at p-value <0.05.

Results:

Table (1) indicates that the age of the bakers in the study sample ranged between 15 and 65 years, with a median of 30 years. Additionally, 63.1% were unmarried and 67.6% resided in rural areas. Furthermore, 55.9% of the study sample had secondary education and 57.7% of them were smokers.

Table (2) shows the current job of the bakery workers, 20.7%, 18.0%, 17.1%, and 16.2% of the study sample were tanseem, baker, dough, and sahlagui respectively, followed by cutting dough (14.4%), vendor (9.0%), and spreading dough (4.5%), with median 8.0 working hours/day. Additionally, the mean years of experience for the study sample was 8.0 ± 8.7 years, with a median of 4.0 years. Furthermore, 85.6% of the study sample had job training and 28.8% had pre-placement exam. An equal percentage of 27.0% had chest X-ray and lab tests, whereas 36.0% of bakery workers had health certification and only 9.9% of them had regular checkup.

Table (3) reveals that the greatest hazards related to job exposure inside bakeries as reported by the study sample was physical (heat/noise/lighting) (53.2%), followed by psychological stress (36.9%) and the lowest hazard was ergonomics (heavy lifting/awkward position/fall) (7.2%), and non-job

exposure to chemical and biological inside bakeries. Additionally, the same table indicates that the major signs/symptoms reported by bakers in the study sample were skin burns (27.9%) and dermatitis (18%), eyes inflammation (33.3%) and conjunctivitis (29.7%), equal percentage of 4.5% for signs/symptoms of GIT (nausea & vomiting), respiratory dry cough (45%), running nose (38.7%), chest pain (35.1%), followed by dyspnea (25.2%) and wheezing (20.7%), cardiovascular arrhythmia (45.9%), neurological headache (65.8%), musculoskeletal bone aches (54.1%) and varicose veins (15.3%).

Table (4) displays knowledge about first aid among bakery workers in the study sample before and after the intervention. Only 5.4 % and 7.2% of the bakery workers identified the wound and burn definitions respectively before intervention compared with 81.1% and 85.6% after intervention. Considerable improvement was noticed between the studied sample before and after interventions implementation related to knowledge of all first aid items and proper position in ergonomics among the studied sample ($P < 0.001^*$). Furthermore, the total satisfactory score of their knowledge increased from 16.2% in pre intervention to 100% at post intervention. All the differences in knowledge items related to first aid were observed as statistically significant ($\chi^2 = 160.05, P < 0.001$).

Data in the same table show the first aid practices as observed among bakers in the study sample before and after the intervention. Few percentages (2.7, 6.3, 5.4, 2.7 & 13.5% respectively) of bakery workers identified had adequate practice about wound care, first aid for burns,

syncope, asthma, and ergonomic maneuvers at before intervention compared with 82.9, 81.1, 79.3, 83.8, and 86.5%, respectively, after intervention. Moreover, only 0.9% of the bakery workers had total adequate practice about first aid before intervention compared with 75.7% after the intervention. All the differences in practice items related to first aid were observed as highly statistically significant ($\chi^2 = 131.33, P < 0.001$).

Concerning table (5) which describes work environment assessment of the 25 bakeries. It reveals shows that the owners of bakeries were not training all persons assigned to a job. Additionally, 32% of bakery workers dealt with fire/emergency preparedness and 52% knew the means of safe exits. Moreover, 60% recall that the level of lighting is adequate for safe and comfortable performance of work; for 76%, the work area is clean, and for 52%, employees' facilities are adequate. Furthermore, none of bakery workers wear Personal Protective Equipment (PPE). In general, 96% of bakeries have inadequate total working environment.

Table (6) displays that there were significant negative correlations between bakery workers' knowledge score and numbers of hazards reported ($r = -.001$), experience years ($r = -.018$) and daily working hours ($r = -.173$). However, a highly statistically was significant positive correlation between bakery workers' knowledge score and educational level ($r = .680$), age ($r = .045$), and numbers of signs/symptoms ($r = .019$) the positive correlations were only significant. Additionally, there were negative correlations between bakery workers' practice score and daily working hours ($r = -.481$), numbers of

hazards reported ($r=-.118$), and numbers of signs/symptoms ($r=-.061$). However, there was a highly statistically positive correlation between bakery workers' practice score and educational level ($r=.549$), while for age ($r=.136$), and experience years ($r=.053$), correlations were only significant

In multivariate analysis, **table (7)** shows statistically significant independent positive predictors of bakery workers' knowledge scores related to first aid, these were their intervention, natural gas, age, urban residence, and educational level. On the contrary, their working hours was a negative predictor (-0.54). The model explains 0.89% of the variation in this score. As regards practice score, the same table indicates statistically significant independent positive predictors of bakery workers' practice scores related to first aid, these were their intervention, natural gas, educational level, work hours and knowledge score. The model explains 0.91% of the variation in this score. Concerning numbers of signs/ symptoms positive predictors of bakery workers were detected with age, numbers of diseases and numbers of hazards. The model explains 0.49% of the variation in this score, whereas none of the other bakery workers' characteristics had a significant influence on it

Figure (1) illustrates most diseases reported by bakers in the study sample before and after starting current job they had eye problems followed by hypertension, and respiratory problems.

Figure (2) indicates correlation between bakers' knowledge and practice scores. It indicates an increase in bakers first aid practices' score with increasing bakers' knowledge.

Figure (3) shows a negative correlation between bakers' perception of workplace hazards and safe work environment score. It indicates an increase in these hazards with decreasing workplace safety precautions.

Hypothesis:

According to the hypothesis which stated that, bakery workers' knowledge and practice levels related to first aid will be improved after educational intervention, the main objective of the present study has been achieved to a high degree, where results indicated high improvement levels were noticed among bakery workers after intervention related to knowledge and practices of all first aid items (table 4 and table 5).

Table 1: Demographic Characteristics of Bakers in the Study Sample (n=111)

Demographic characteristics	Frequency	Percent
Age:		
<30	49	44.1
30+	62	55.9
Range	15.0-65.0	
Mean±SD	33.5±12.7	
Median	30.0	
Gender:		
Male	109	98.2
Female	2	1.8
Residence:		
Rural	75	67.6
Urban	36	32.4
Education:		
Read/write	27	24.3
Basic	20	18.0
Secondary	62	55.9
University	2	1.8
Marital status:		
Unmarried	70	63.1
Married	41	36.9
Smoking	64	57.7

Table 2: Job Characteristics of Bakers in the Study Sample (n=111)

Job characteristics	Frequency	Percent
Current job:		
Tanseem	23	20.7
Baker	20	18.0
Dough	19	17.1
Sahlagui	18	16.2
Cutting dough	16	14.4
Vendor	10	9.0
Spreading dough	5	4.5
Work hours/day		
<9	58	52.3
9+	53	47.7
Range	3.0-17.0	
Mean±SD	9.2±3.2	
Median	8.0	
Experience years:		
<5	56	50.5
5+	55	49.5
Range	1.0-45.0	
Mean±SD	8.0±8.7	
Median	4.0	
Workplace provides:		
Job training	95	85.6
Pre-placement exam	32	28.8
Chest X-ray	30	27.0
Lab tests	30	27.0
Health certification	40	36.0
Updated	23	38.3
Regular checkup	11	9.9
Had previous related job	52	46.8

Table 3: Job Exposures and Related Signs /Symptoms As Reported By Bakers in the Study Sample (n=111)

Job exposures and related symptoms/signs	Frequency	Percent
Reported job exposures:		
Physical (heat/noise/lighting)	59	53.2
Chemical	0	0.0
Biological	0	0.0
Psychological stress	41	36.9
Ergonomic (heavy lifting/awkward position/fall)	8	7.2
Reported signs /symptoms:		
Skin:		
Burns	31	27.9
Dermatitis	20	18.0
Hair loss	18	16.2
Eyes:		
Inflammation	37	33.3
Cataract	0	0.0
Conjunctivitis	33	29.7
Decreased visual acuity	29	26.1
GIT:		
Anorexia	3	2.7
Nausea	5	4.5
Vomiting	5	4.5
Diarrhea	4	3.6
Respiratory:		
Asthma	3	2.7
Wheezing	23	20.7
Running nose	43	38.7
Chronic cough	13	11.7
Dyspnea	28	25.2
Dry cough	50	45.0
Productive cough	17	15.3
Chest pain	39	35.1
Cardiovascular:		
Arrhythmia	51	45.9
Hypertension	16	14.4
Angina	0	0.0
Neurological:		
Dizziness	42	37.8
Headache	73	65.8
Musculoskeletal:		
Fatigue	48	43.2
Bone aches	62	54.1
Varicose veins	17	15.3

Table 4: Statistical Difference between Pre and Post Intervention Regarding Knowledge and Practices Of First Aid Among Bakers In The Study Sample

Knowledge and practice	Intervention				X ² test	p-value
	Pre (n=111)		Post (n=111)			
	No.	%	No.	%		
Correct knowledge of:						
First aid definition	27	24.3	111	100.0	135.13	<0.001*
First aid goal	64	57.7	110	99.1	56.24	<0.001*
First aid phone	93	83.8	111	100.0	19.59	<0.001*
Civil defense phone	23	20.7	110	99.1	141.95	<0.001*
Essential pharmacy	83	74.8	111	100.0	32.04	<0.001*
Wounds definition	6	5.4	90	81.1	129.50	<0.001*
Wounds first aid	7	6.3	86	77.5	115.49	<0.001*
Burns definition	8	7.2	95	85.6	137.09	<0.001*
1 st degree burns	76	68.5	111	100.0	41.55	<0.001*
Burns first aid	6	5.4	100	90.1	159.53	<0.001*
Asthma first aid	31	27.9	103	92.8	97.60	<0.001*
Syncope	34	30.6	108	97.3	107.01	<0.001*
Syncope first aid	21	18.9	110	99.1	147.51	<0.001*
Proper position in ergonomic	13	11.7	95	85.6	121.24	<0.001*
Total knowledge:						
Satisfactory (50%+)	18	16.2	111	100.0		
Unsatisfactory (<50%)	93	83.8	0	0.0	160.05	<0.001*
Adequate practices (60%+):						
Wound care	3	2.7	92	82.9	145.75	<0.001*
First aid for burns	7	6.3	90	81.1	126.13	<0.001*
First aid for syncope	3	2.7	88	79.3	134.55	<0.001*
First aid for asthma	6	5.4	93	83.8	137.99	<0.001*
Ergonomic maneuvers	15	13.5	96	86.5	118.22	<0.001*
Total practice:						
Adequate (60%+)	1	0.9	84	75.7		
Inadequate(<60%)	110	99.1	27	24.3	131.33	<0.001*

Highly Statistically significant at p<0.01

Table 5: Environmental Assessment of the 25 Bakeries in the Study Sample

Work environment assessment	Adequate (60% +met)	
	No.	%
Training	0	0.0
Work conditions	4	16.0
Work process	5	20.0
Fire/emergency preparedness	8	32.0
Safe exits	13	52.0
Lighting	15	60.0
Housekeeping	19	76.0
Noise	6	24.0
Employees' facilities	13	52.0
Medical/first aid	0	0.0
Personal Protective Equipment (PPE)	0	0.0
Materials handling and storage	16	64.0
Total work environment		
Adequate (60%+)	1	4.0
Inadequate (<60%)	24	96.0

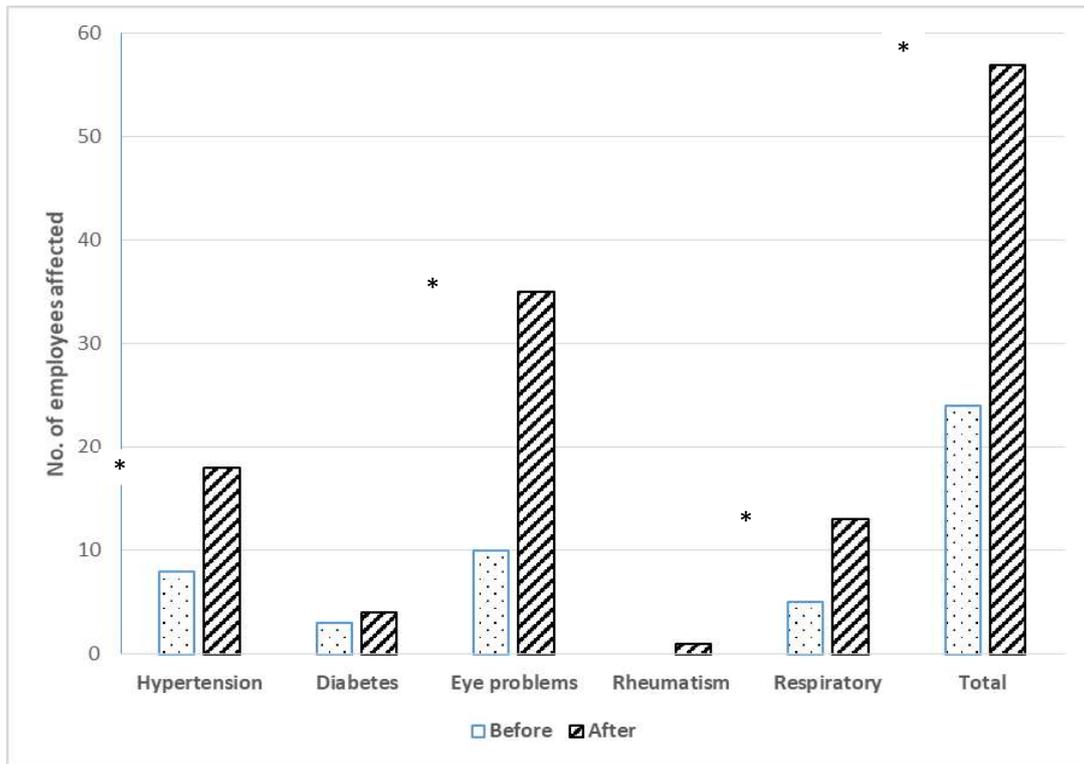
Table 6: Correlation between Bakers' Pre-post Improvements in Knowledge and Practice Scores and Their Characteristics

Items	Spearman's rank correlation coefficient	
	Pre-post score improvements	
	Knowledge	Practice
Pre-post practice score improvement	.595**	
Age	.045	.136
Educational level	.680**	.549**
Experience years	-.018	.053
Daily working hours	-.173	-.481**
No. of hazards reported	-.001	-.118
No. of signs/symptoms	.019	-.061

(**) Statistically significant at $p < 0.01$

Table 7: Best Fitting Multiple Linear Regression Model for the Knowledge and Practice Scores

Items	Unstandardized Coefficients		Standardized Coefficients	t-test	p-value	95% Confidence Interval for B	
	B	Std. Error				Lower	Upper
Knowledge							
Constant	-78.52	7.17		10.948	<0.001	-92.67	-64.36
Intervention	61.74	1.67	0.90	36.871	<0.001	58.43	65.05
Natural gas	4.41	1.82	0.06	2.422	0.017	0.82	8.01
Age	0.15	0.07	0.06	2.185	0.030	0.01	0.29
Urban residence	4.15	1.78	0.06	2.336	0.021	0.64	7.65
Education level	10.99	0.97	0.28	11.300	<0.001	9.07	12.91
Working hours	-0.54	0.27	-0.05	-2.022	0.045	-1.07	-0.01
r-square=0.89 Model ANOVA: F=252.34, p<0.001 Variables entered and excluded: job type, smoking, bakery type, diseases, hazards, past related job							
Practice							
Constant	-60.01	6.94		8.648	<0.001	-73.71	-46.31
Intervention	37.72	4.61	0.55	8.188	<0.001	28.63	46.82
Natural gas	11.82	1.70	0.17	6.942	<0.001	8.46	15.19
Education level	6.63	1.15	0.17	5.744	<0.001	4.35	8.91
Working hours	-1.29	0.25	-0.12	5.138	<0.001	-1.78	-0.79
Knowledge score	0.35	0.07	0.35	5.017	<0.001	0.21	0.49
r-square=0.91 Model ANOVA: F=351.41, p<0.001 Variables entered and excluded: age, residence, job type, smoking, diseases, hazards, past related job							
No. of signs/symptoms							
Constant	-8.28	5.80		1.428	0.157	-19.81	3.26
Age	0.36	0.14	0.24	2.636	0.010	0.09	0.63
No. of diseases	5.45	2.06	0.25	2.648	0.010	1.36	9.54
No. of hazards	0.73	0.12	0.48	6.007	<0.001	0.49	0.97
r-square=0.49 Model ANOVA: F=28.72, p<0.001 Variables entered and excluded: education, experience, marital status, residence, smoking, training, job/bakery type, knowledge and practice scores							



(*) Statistically significant at $p < 0.05$

Figure 1: Diseases Reported by Bakers in the Study Sample before and after Starting Current Job

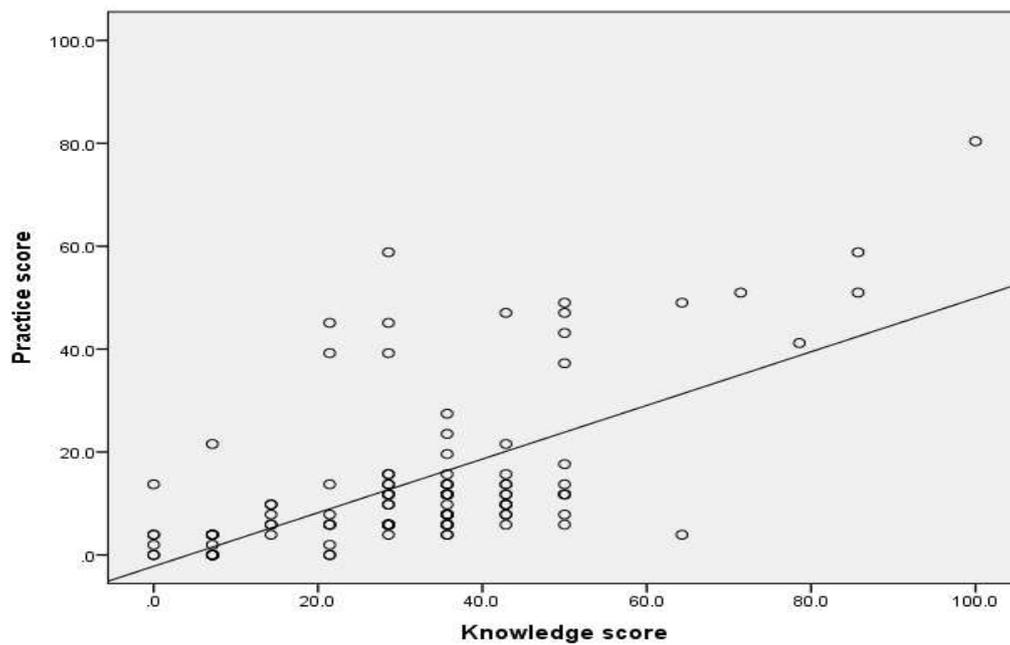


Figure 2: Correlation between Bakers' knowledge and practice scores

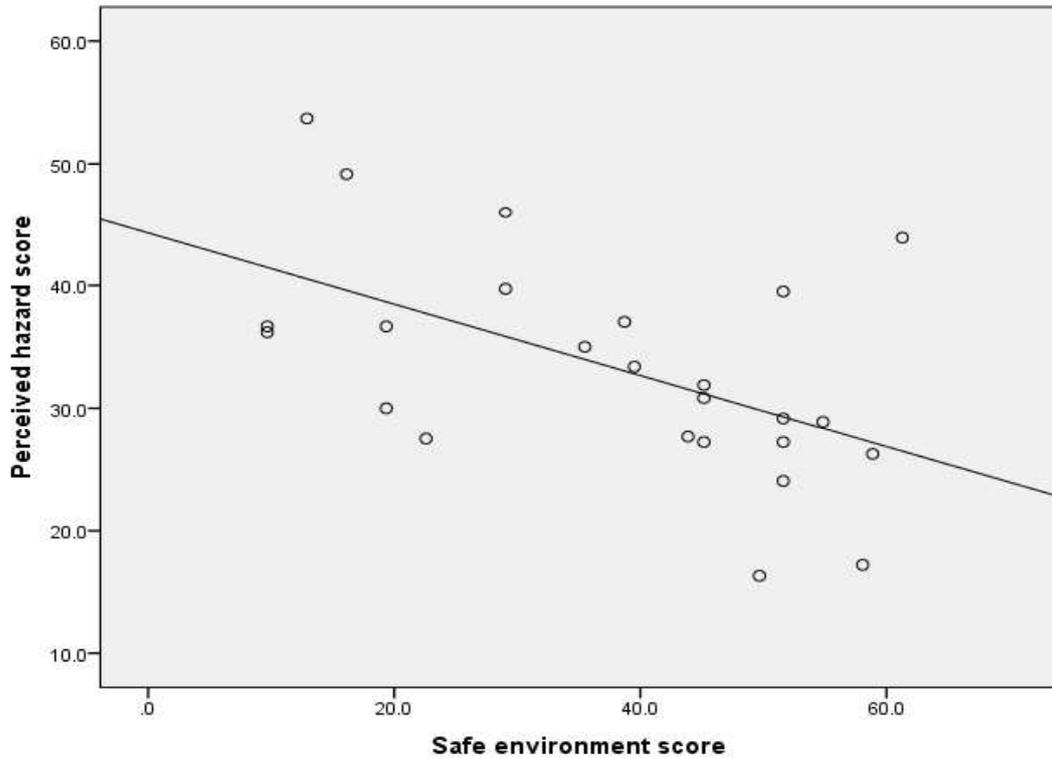


Figure 3: Ecologic Correlation between Bakers' Perception of Workplace Hazards and the Observed Safe Work Environment Score

Discussion:

Most adults spend a third of their time at work. As no work is free of risk, all workers must have some basic knowledge about the workforce, and the hazards related to work **Stanhope & Lancaster (2019)** ⁽¹⁵⁾. Work environment is the study of the design of a workplace, equipment, machine, tool, product, and system that considers the physical, physiological, biomechanical, and psychological capabilities of humans and improves the effectiveness and productivity of work systems while ensuring the safety, health, and welfare of workers. In general, the goal of ergonomics is the fit of the task to the individual, not the individual to the task Health and Safety Authority Ergonomics **(2015)** ⁽⁹⁾.

The aim of this study was to evaluate the effect of educational intervention on knowledge and practices of bakery workers toward first aid related to occupational hazards. The results of the study show deficiencies in the knowledge and practices among these bakery workers about first aid and work environment in the implementation of the pre-test. In addition, the improvements that were detected in the knowledge and practices of bakery workers regarding first aid and ergonomics after the intervention were notable.

The current study results showed that the age range of bakery workers was 15–65 years with a mean of 33.5 ± 12.7 . These results were in line with those of a very recent study by **Abu-elmatty et al. (2022)** ⁽¹⁶⁾ in Port Said Governorate, about "Occupational health hazards and safety measures among bakery workers at Port Said City", which reported that the age of bakery workers ranged

between 12-58 years with a mean of 32.30 ± 12.09 and agreed with a study by **Mohammadien et al (2013)** ⁽¹⁷⁾, in Sohag Governorate, Egypt which reported that the age of the flour milling workers ranged between 17 and 66 years with a mean of 38.8 ± 11.2 years. As well, the current study result was consistent with those of a study by **El-Feky et al (2020)** ⁽¹⁸⁾, about "Health disorders and safety measures among workers in Tanta Flax and Oil Company, Egypt", who found that mean age of workers $39.97 + 11.81$ and ranged from 21 to 59. However, this study results disagreed with that of in earlier study by **Emmanuel and Arinze-Onyia (2014)** ⁽¹⁾, in Nigeria, who found that the age range of bakers was 21–25 years. This might be owing to the difference of locations and economic causes.

The findings of current study showed that more than half of studied sample had secondary education, whereas about one-quarter first /read and write, and less than one-fifth had basic education. The results were accordance with to those of **Yossif and Abd Elaal (2012)** ⁽¹³⁾, in Benha City Egypt, which reported that more than half of the bakers were highly educated, whereas more than a quarter were less educated, and less than one-fifth had intermediate education. The high level of education of workers may rare contributed to improving their knowledge and practices in the post-implementation phase which agreed with the result of a study by **Abad-Elzaher et al., (2018)** ⁽¹⁹⁾ in Assuit City, Egypt, which showed that about half of the studied workers had secondary technical educational level. On the contrary, these study

results disagreed with that of **El-Feky et al (2020)** ⁽¹⁸⁾, in Egypt, which revealed that half of studied workers had primary level education and also with that of **Das et al. (2017)** ⁽⁶⁾, in Bangladesh, which revealed that majority of the workers are not highly educated and with results of **Bonsu et al. (2020)** ⁽¹¹⁾ about "Exposure to occupational hazards among bakers and their coping mechanisms in Ghana" revealed that 41.3% of the respondents had no level of formal education. This demonstrates a low educational background among their respondents.

As regards years of experience, the current study findings revealed that slightly more than half of bakery workers had past-experience of less than 5 years and more than half of them worked less than nine hours/day. These results agreed with those of a study carried out by **Emmanuel and Arinze-Onyia (2014)** ⁽¹⁾, in Nigeria, which reported that most bakers had worked five years or less, and approximately half of the bakers worked between 7 and 12 hours a day. These results were also in agreement with those of **Yossif and Abd Elaal (2012)** ⁽¹³⁾, in Benha City, Egypt, which mentioned that most bakers worked 6–12 hrs/day. However, the previous results disagreed with their past-experience, as 60% of them had past work experience of more than 5 years, which agreed with **Clark (2008)** ⁽²⁰⁾, who reported that majority of the respondents had worked 5 years or less and about half of the bakers worked an average of between 7 and 12 hours a day. However, these results were in congruent with those of a study by **Das et al (2017)** ⁽⁶⁾, in Bangladesh, which revealed that most workers

worked 7–8 hours per day and also disagreed with those of a study by **Bonsu et al. (2020)** ⁽¹¹⁾, who mentioned that most of the respondents indicated that they had worked in the bakery industry for more than 11 years. The contradiction with this study results might be owing to differences in settings.

The results of present study revealed that the greatest hazards related to job exposure inside bakeries as reported by more than half bakery workers were physical (heat/noise/lighting), followed by more than one third psychological stress and the lowest hazard was ergonomic (heavy lifting/awkward position/fall). This might be due to that none of bakery workers wear PPE and most of bakeries had inadequate work environment in the present study. These results are consistent with those of **Sheha (2009)** ⁽²¹⁾, which reported that the highest hazards were physical and psychological because of the enforcement of the harassment law such as stress and anxiety. Similarly, this result is congruent with that of a study conducted by **Bonsu et al. (2020)** ⁽¹¹⁾, which found that the bakers were exposed to different types of occupational hazards, including physical (noise, flour dust/smoke, fire, and high temperature), psychosocial (stress, verbal abuse, and poor interpersonal relationship), and ergonomic hazards (standing, sitting, and bending repetitively). Additionally, this finding is consistent with that of a study conducted by **Abou-Elwafa et al. (2017)** ⁽²²⁾, who found that workplace hazards, which included noise, temperature extremes, and psychosocial stressors, were the most hazards. As

well, this result in same line with that of a very recent study by **Abu-elmatty et al. (2022)** ⁽¹⁶⁾, which showed that most bakers were exposed to physical risks in the work environment. This might be owing to the lack of educational intervention in ergonomics for the bakery workers.

Concerning the major signs/symptoms reported by bakers in the current study, these were skin burns and dermatitis, eye inflammation and conjunctivitis, signs/symptoms of GIT (nausea & vomiting), respiratory dry cough, running nose, chest pain followed by dyspnea and wheezing, cardiovascular arrhythmia, and neurological headache, more than half musculoskeletal bone aches and varicose veins and most diseases reported by bakery workers in this study before and after starting current job had eye problems followed by hypertension and respiratory problems. These results are in the same line with those of a recent study by **Vijaya Lakshmi et al. (2021)** ⁽²³⁾ about "health problems of workers in bakery cum millet processing units", which revealed that various problems felt by bakery workers were eye irritation, falls/slips and muscle pain/discomfort, sneezing due to flour mixing/milling; moderate to severe pain in neck, shoulders, upper back, lower back, neck, hips, upper legs, lower legs, ankles and feet. Moreover, this study finding agreed with **El-Feky et al. (2020)** ⁽¹⁸⁾, who indicated that more than half of workers in flax manufacturing department complained of cough and wheeze as well, in agreement with **Bonsu et al. (2020)** ⁽¹¹⁾, who found highlighted that the health risks were associated with exposure to the

different forms of occupational hazards among bakers which include rhinitis, excessive cough, irritation of the eye and wheezing, resulting in breathlessness, burns, scalds, dizziness and bodily pain (lower back pain, shoulder pain, neck pain, pain in the hand and, muscle spasm and pain in the leg). This implies that the bakers may not be applying adequate preventive measures to protect themselves.

Regarding knowledge about first aid among bakery workers, in the current study before intervention, the result revealed that minorities of bakery workers identified wounds and burns first aid at pretest. Moreover, the findings of this study revealed that less than one fifth of the bakery workers had total satisfactory knowledge score of first aid before intervention. From the researchers' point of view, these findings could be attributed to lack of education for bakery workers in basic emergency police and to deal with crises in bakery. These results were in line with those of a study, in Nigeria, conducted by **Emmanuel and Arinze-Onyia (2014)** ⁽¹⁾, who found that most of bakers lacked knowledge of these hazards and their presenting symptoms. This implies that the bakers may not be applying adequate preventive measures to protect themselves. Similarly, a study carried out by **Yossif and Abd Elaal (2012)** ⁽¹³⁾, had also reported poor knowledge of occupational diseases and their methods of prevention. This indicates the need for training needs for these workers to equip them with information on the risks they are exposed to, daily at work, and how to control them. This is because a relationship has been found by

Fishwick et al (2011) ⁽²⁴⁾, to exist among similar workers between reduced occupational symptoms and having good knowledge of the potential health effects of their exposures. Furthermore, this result was in line with that of **Abad-Elzaher et al. (2018)** ⁽¹⁹⁾, who clarified that majority of bakery workers who had unsatisfactory knowledge in pretest and it improved in posttest.

Appropriate first aid and initial treatment can significantly reduce the severity of burn injuries and improve survival as detected by **Qtait et al. (2019)** ⁽⁴⁾, and who highlighted that, awareness of first aid for burn injuries in the general population, especially workers as vulnerable groups, plays an important role in ensuring self-rescue and helping each other reduce the severity of burn injury, as well as deaths in case of an accident, especially in mass casualty accidents. According to global reports, knowledge of community first aid for burns is rather limited, especially in developing and underdeveloped countries as identified by **Kattan et al. (2016)** ⁽²⁵⁾. These reports were supported by **Wallace et al. (2013)** ⁽²⁶⁾, who found that only 35% of respondents had sufficient knowledge. The correct response rate was 15% higher in first aid groups who had been trained in first aid in the past 5 years (about 50% of participants). Most of the participants who had not participated in any first aid training for burns had limited knowledge; of these, only 15% have sufficient knowledge and only 10% know the practice of cooling the wound surface with a burn. Concerning answering the hypothesis which stated that, bakery workers'

knowledge and practice scores related to first aid will be improved after educational intervention, the main objective of the present study has been achieved to a high degree, where results indicated high improvement levels were noticed among bakery workers after intervention implementation related to knowledge and practices of all first aid items. From the researchers' point of view, these improvements may be attained to the results of training courses offered to bakery workers during the intervention. Additionally, they were excited to participate in the educational sessions and revealed readiness to attend future educational programs. Therefore, these interventions have been successful in improving bakers' knowledge and first aid practices. The previous result was consistent with that of **Yossif and Abd Elaal (2012)** ⁽¹³⁾, who conducted a study in Benha City and generally detected high level scores of practices. Similarly, results of the study carried out by **Abad-Elzaher et al (2018)** ⁽¹⁹⁾, in Assuit City, Egypt, indicated that the bakery workers had unsatisfactory knowledge and practices in pre-test, while after implementation of the educational program their knowledge and practices were improved.

Regarding first aid practices as observed among bakers in the current study before and after the intervention, few percentages of bakery workers identified had adequate practices about wound care, first aid for burns, syncope, asthma, and ergonomic maneuvers at before intervention compared with majority of them after intervention. Moreover, less than one percent of the bakery workers had

adequate first aid total practices before intervention compared with slightly more than three quarters after the intervention. This finding was consistent with that of a study carried out by **Bazargani et al. (2013)** ⁽²⁷⁾, which investigated people with burns injuries and found that most of them tried to go to the hospital as soon as possible. Patients believe that using cool water would cause more damage to burn. In addition, patients are also thought of in-home remedies to reduce pain and inflammation that would lead to better wound healing and better scar appearance and few of them knew the methods to extinguish fire and how to escape from a fire.

Concerning answering the hypothesis regarding bakery workers' knowledge and practice score regarding ergonomics will be improved after intervention, the main objective of the present study was highly achieved as the results showed high degrees of knowledge and practices. From the researchers' point of view, these improvements may be because the worker is involved in ergonomic interventions which offer a greater likelihood of reducing musculoskeletal problems. Furthermore, applications of workplace ergonomic principles require removal of two types of barriers: knowledge/practice based and organizational. In the current study, minority of bakery workers knew proper ergonomic maneuvers in pretest intervention compared with majority in post-test intervention. This result agreed with that of **Souza and Filho (2017)** ⁽²⁸⁾, who indicated that when working with high surfaces, the neck and back of the workers become

overloaded. On the contrary, when these tables are too low, the trunk bends too much. Overcoming these positions can lead to muscle and skeletal dysfunction, as well as musculoskeletal pain as well as muscular pain. On the same line, **Beheshti et al. (2016)** ⁽²⁹⁾, indicated that bakers, because of the nature of their jobs, are at risk of MSDs caused by ergonomic factors. Good manufacturing practices directly affect the health and security of workers and the quality of product.

Concerning work environment assessment of the 25 bakeries in the present study, results showed that the owners of bakeries were not training all persons assigned to a job. Additionally, about one third of bakery workers dealt with fire /emergency preparedness and more than half knew the means of safe exits. Moreover, sixty percent of bakery workers recall that the level of light is adequate for safe and comfortable performance of work and three quarters reported the work area is clean and about one quarter reported noise and more than half mentioned employees' facilities. Furthermore, none of bakery workers wore Personal Protective Equipment (PPE). In general, most of bakeries have inadequate working environment.

These study results are in line with those of **Souza and Filho (2017)** ⁽²⁸⁾, who showed the physical work environment is affected by high temperatures, inadequate lighting, excessive noise, and biological hazards, which interfere with the quality of work and the health of workers and also, agreed with results of **Vijaya et al. (2021)** ⁽²³⁾, who classified that absence of adjustable equipment as per their

height, adequate both natural and artificial light caused discomfort while working. Furthermore, these previous results were in accordance with those of **Yossif and Abd Elaal (2012)** ⁽¹³⁾, in Benha, which revealed that regarding the use of protective devices, all bakers have weak score in all items of protective devices before starting work. They assisted that, protection devices are very important to protect workers from occupational hazards. In each bakery, there must be provision of a first-aid box containing first aid supplies. However, these results disagreed with those of the study carried out in **Nigeria** by **Emmanuel and Arinze-Onyia (2014)** ⁽¹⁾, which indicated that most of workers used PPE. From the researchers' point of view, the contradiction with this study results might be attributed to difference with the Egyptian culture.

Conclusion:

In the light of the results of the current study, it can be concluded that the educational intervention was effective in increasing the level of knowledge and practices of bakery workers towards first aid as well as ergonomics related to occupational hazards in bakeries.

Recommendations:

In the light of the findings of the present study, the following recommendations are suggested:

- Continuous educational programs are to be applied to all workers at bakeries in Sharkia Governorate to raise their knowledge and practices about first aid and ergonomics related to occupational

hazards as well to the newly assigned persons to this job.

- Bakery workers should be adequately informed about the specific hazards associated with bakery job.
- First aid facilities and PPE should be available in all bakeries.
- The bakery environment needs more attention to be safe for the workplace.
- Conduct further training courses for bakery workers in bakeries at Sharkia Governorate.

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